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47380

November 1993

Radio Control

CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

PARKING LOT RACING

LOW COST FUN!



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SPECIAL

- PROJECT
NITRO
T-BIRD
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WE TEST THE
TRAXXAS

TRX-3

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On the cover: parking lot racing invades our shores! (Photo by Chris Chan.) On this page: Kyosho's Inferno ST. (Photo by A. Flatbush.)

EDITORIAL

WILL PARKING LOT RACING SAVE THE WORLD?

Many manufacturers and retailers are hoping it will.

During the "boom" years between 1986 and 1988, the radio-control car hobby was just that—a hobby (one, some would say, that has become a sport). Back then, the vast majority of kits more closely resembled scale models than racing vehicles, and most activity took place on deserted streets and in backyards.

Many say that it was this type of "fun" racing that led to the boom. If you were the first R/C-car owner on your block, you were most assuredly joined by a herd of others as the word spread. Soon, there were thousands of isolated pockets of R/C car enthusiasts scattered throughout the country. As with any hobby, some of them eventually lost interest, while others vigorously pursued it. Hardcore neighborhood racers formed local racing clubs, and some industrious hobbyists built permanent racetracks.

The models weren't extremely sophisticated; most traced their roots back to inexpensive Japanese kits that were molded almost exclusively of plastic. Very few racers owned modified motors, and even fewer owned electronic speed controllers. There were perhaps three or four types of tires from which to choose; you were never beaten by a pair of tires, because your competition was in the same boat.

Somewhere along the way, people found that electronic speed controllers gave much more responsive throttle control and rarely burned out. The racers who owned ESCs compet-

ed against those who didn't. The frustrated "have-nots" soon traded in their mechanical speed controllers forever. With better speed controllers, you could run longer and use faster motors. Faster motors soon called for better batteries, and the list went on.

It was here that we as hobbyists, and the R/C car industry as a whole, lost sight of what was important—



why we pursue hobbies—relaxation and enjoyment. We've developed a "win-at-all-costs" attitude across the board: everyone wants to be sponsored, and the manufacturers emphasize winning races. They've forgotten that by going all-out to beat rival companies, they're also beating their customers.

There's no blame to be placed in this situation. We, as consumers, tell the manufacturers what we want with each purchase we make. And we've been telling them that high-end racing

is where the action is. The problem is that no one is addressing the issue of new blood. Is it just me, or is the fact that the industry has receded into a racing core while entry-level products and promotion have been ignored too much of a coincidence? Maybe I'm wrong, but everyone seems to be scratching his head and asking why the R/C-car industry isn't attracting as many newcomers as it once did. If the only public exposure we get is high-end racing—where factory drivers compete against one another and drivers use new tires for each round of qualifying—is it any wonder that potential hobbyists are turned off?

I think that expert- and pro-type racing have a very important place in the R/C car industry, but the sun doesn't rise and set on high-level, professional competition. After all, R/C car racing will always be an activity for participants, not spectators. Given the choice, most people would rather watch a full-size auto race, football game, or tennis match than watch an R/C car race.

This hobby is so appealing to so many people because, for a comparatively low initial cost, you can actually build and drive a race car, monster truck, or motorcycle.

(Continued on page 94)



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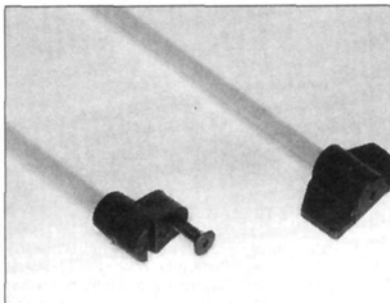
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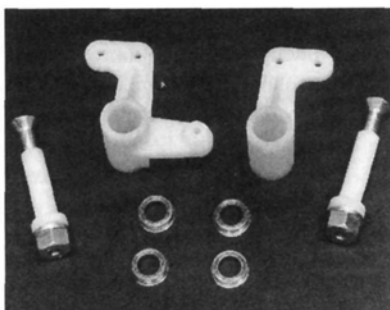
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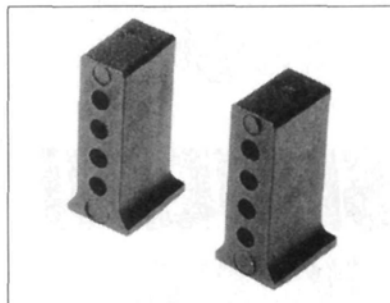
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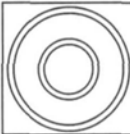
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LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

GO FOR THE BURN

I am writing to congratulate you for the great job you are doing with the magazine. I just started in the hobby, and I enjoy a lot of your technical reviews and tips.

I have only one small "complaint." How can a publication of your caliber let John Rist determine the temperature of an ESC during the "let-it-cook" test by touching the ESC? I almost flipped over in my chair when, in the review of the Hitec SP-520, he burned his finger during the test. If *R/C Car Action* would invest in a simple surface-temperature probe, which I bet you could get for less than \$50, he could avoid a bad burn. In addition, a "warm" or "too hot to touch" description is a relative measurement. It might be hot for John Rist, but I bet that for the Ayatollah [of Radio Controlla], it would be OK.

With this little piece of information, your technical review will be perfect, and people can see that the temperature for the X-brand is 165 degrees, versus 100 degrees for brand Y. Thanks for the opportunity, and keep up your great work.

GERARDO VELAZQUEZ
Vicksburg, MS

John Rist responds: "It might not be the most scientific approach to touch the heat sink to see whether it's hot enough to burn my finger, but you have to admit that half the fun of reading 'Scoping Out' is to see whether I've sustained bodily damage in support of our wonderful hobby."

"All kidding aside, I've thought about using a digital temperature

probe for the 'let-it-cook' test, but I decided against it for several reasons. First, there is a close correlation between 'on' resistance and the amount of heat one can expect from a speed controller. If you're shopping based on 'Scoping Out' test results, the 'on' resistance provides hard numbers for a good comparison. Low 'on' resistance numbers—such as those found in Novak's 410 HPC and Tekin's 411-G2—mean cool running. The higher 'on' resistance found in the less expensive Hitec SP-520 means a hot-running speed controller.

"Another reason for not rushing out and buying a digital thermometer is that most R/C car drivers don't own one, either. By using relative terms such as 'too hot to touch' or 'barely above room temperature,' I hope to provide information that readers can use to compare the 'Scoping Out' test results with their own controllers.

"Also, many things can affect a temperature reading taken with a digital thermometer: the room temperature, the probe location and method of attachment, the length of the test, the speed controller's starting temperature and thermometer 'settling' time. It would be unfair and meaningless to start a temperature war among manufacturers by giving out hard temperature numbers.

"One last thought: 'painful to touch' (for all but the Ayatollah of Radio Controlla) starts at 120 degrees Fahrenheit. Most power-handling FETs are alive and well with case temperatures that far exceed 212 degrees Fahrenheit."

SWITCHAROO

I purchased an Inferno DX about three months ago, and I just saw an ad in my issue of *Car Action* for an Inferno ST. I'm wondering if I can convert my DX to an ST.

I'm also trying to figure something else out: in a "Troubleshooting" letter, a guy referred to a .21 engine as a Paris O.S. engine. I thought that Paris made Rex. What's the deal?

JEREMY DEATON
London, KY

Yes, Jeremy, you can convert your Inferno DX to an Inferno ST. Here are the parts you'll need: two pairs of wheels (no. KYOC6407); two pairs of tires (no. KYOC6215); a bumper set (which includes front and rear body posts; no. KYOC2638); a front body mount (which includes a necessary rear shock tower; no. KYOC5816); a body and wing set (no. KYOC2446); and decals (no. KYOC3215). The Inferno DX comes with a 13-tooth clutch bell, whereas the ST comes with a 12-tooth one. When you add the larger tires to your DX, it will slightly alter your gearing (a little taller); you'll lose some acceleration, but you'll gain top speed. It isn't necessary to change the clutch bell, but if you want a little more snap off the line, change to the 12-tooth one.

As for your other question, whenever Paris's name precedes an engine name, it means that he modified that particular engine.

JH

1/10 GAS BUGGIES?

I've been receiving your magazine for some time now, and I only have one question: can you tell me where anyone races a 1/10-scale gas buggy class? Everywhere I turn is 1/8 scale. Please help!

PATRICK CHRISMAN
Stephens City, VA

Do you mean 1/10-scale nitro trucks, Patrick? As far as we know, no one has even produced 1/10-scale off-road buggies yet! Do you know something we don't know? Right now, there are a few manufacturers that are toying with the idea of producing them. Traxxas has let the word out that they will produce a 1/10-scale nitro buggy. Kyosho has an Inferno Jr. in the works (see the

(Continued on page 144)

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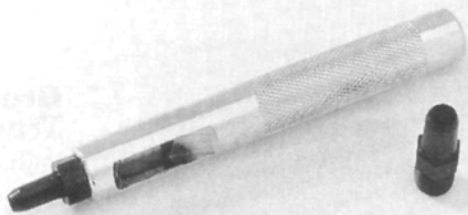
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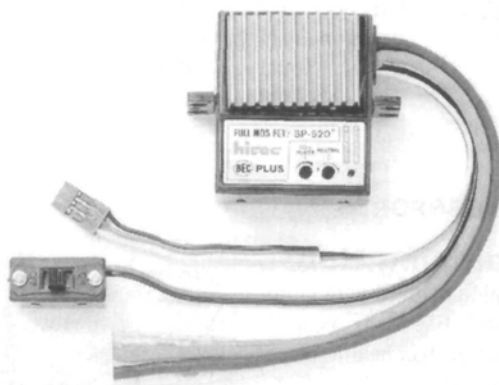
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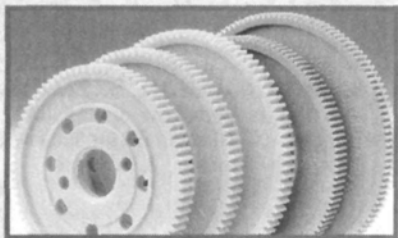
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In general, tracks with many turns and those with more bite, such as carpet tracks, will require lower gearing. Tracks with fewer turns and those with long straights, like velodromes, will need higher gearing. Remember, individual driving styles can also affect gearing; a gear that works for one driver might not work for another.

In short, there's simply no one place to start, because there are so many variables to contend with.

Until next month,
Neal McCurdy
Trinity Team Manager

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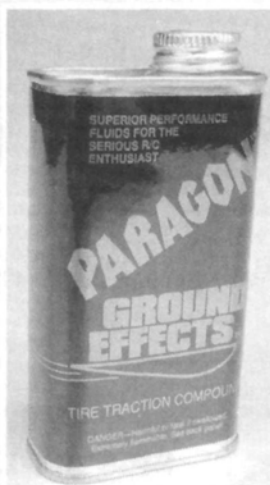
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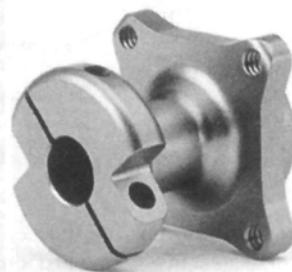


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Magic Motorsports; a subsidiary of Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705.



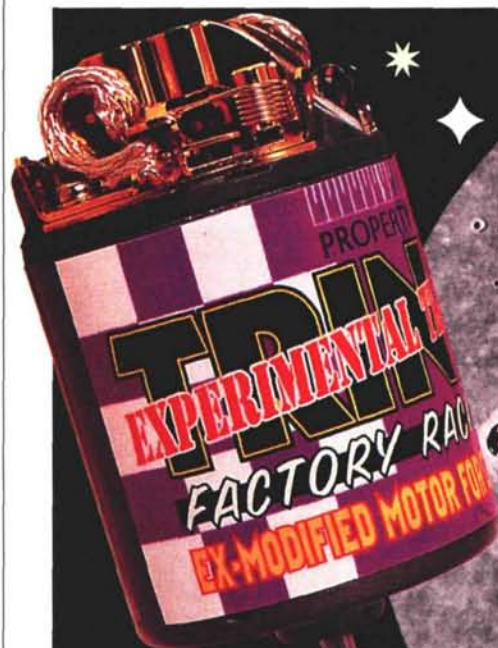
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INSIDE SCOOP

by CHRIS CHIANELLI

IN SEARCH OF FUN AND GLORY, 'CAUSE LIFE'S TOO SHORT TO BE A SHEEP!



THE EX MODIFIED MOTOR

from Trinity is based on the same technology that makes the Slot Machine 2.2 a top performer:

• new endbell design for better cooling, improved brushhoods for less brush wobble, 5.0 wet magnets for a stronger and longer-lasting magnetic field and an all-new armature blank with a commutator that runs true and distorts less.

Right now, there are 11 versions of the EX Modified—from an 8.5 turn 1/18 scale 7-turn single to a mild 1/24 scale motor use on slot cars.

Technology of the Future

They said it couldn't be done. They dared to doubt the immense power (and driving talent) of Team Associated's Brian "Bob" Kinwald. They were wrong! Kinwald, who has recently been on a race-winning rampage (winning the 2WD and 4WD ROAR National Championships), came on strong to win two of the three A-Mains at the '93 IFMAR Off-Road Worlds in Basildon, England.

Top qualifier Joel Johnson (yes, the guy who has won just about every ROAR on-road championship this year) made an excellent showing with his Trinity-powered Losi Double-X to finish second. Kinwald used an Associated Team Car with Reedy power and a set of new Pro-Line tires. This info is so fresh that the 4WD title has yet to be decided. Stay tuned for the big finish!

Kinwald Wins Worlds—edges joel for 2wd win



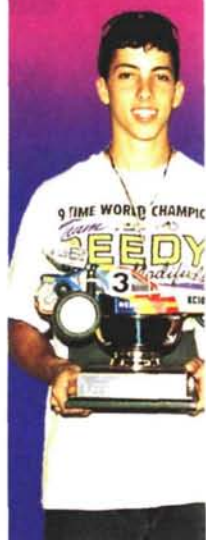
4WD Undosenshu



According to Mugen, their new 1/8-scale Athlete (*Undosenshu* in Japanese) is "a state of the art design that is remarkably durable and easy to maintain"—features that would mean less breakdowns and pit-time. Designed by Team Mugen's Kohji Sanada (1990-1992 IFMAR World Champion), Kohji is someone who has learned what it takes to win and incorporated his findings into the Athlete. Some of the Athlete's features are: 4mm Duraluminum chassis, front and rear disk brakes, full-

ball-bearing set, adjustable wide double wish bone suspension front and rear, small diameter milled steel differential gears and universal joints all around. The Athlete is available from Mugen USA.

ASS AC



Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

- Oil weight remains stable under increasing track heat, so suspension set-up won't change
- 1/2 weights from 10-70
- Allows precise tuning of your suspension to match changing track conditions



\$2.99
All Weights

TRINITY

Trinity Products, Inc.

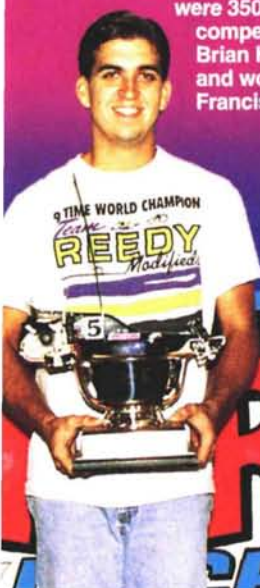
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CIATED S ROAR NATIONALS

R/C Off-Road Raceway,
Fountain Valley, CA—

Team Associated RC10 Team Cars dominate the 1993 ROAR Off-Road Nationals, taking seven of the top 10 places in the A-Main event. There were 350 entries from all around the country competing in this most prestigious event. Brian Kinwald (right) was Top Qualifier, and won the 2WD Modified Class. Mark Francis (center) took second, and Todd Handel (left) third.

All three drivers used RC10s with Reedy Modified Motors.



A Slowpoke's Worst Nightmare

Ever wonder whether your lap times are really improving? If you can handle the truth, Kyosho's new LapBoy is the device that delivers the cold facts. Here's how it



works: switch on the onboard LapBoy memory module, and lay the infrared reflective tape down across the track. Then run your practice laps while the module collects info as the car runs over the tape. When you've

finished, download the info to the LapBoy micro-processor/display unit, then plug this unit into the LapBoy printer and print out the results. LapBoy can record up to 10 lap times. Use several during a race, and there will be no need for guesswork; you and your friends will know for sure who's turning the fastest laps and who's turning the slowest. The LapBoy is a great tool for serious racers who want to improve their driving; it's also a slowpoke's worst nightmare!



ZeroGravity™ Pinions

Trinity Pinions...Ours are precision machined from 6061 T-6 aircraft aluminum and teflon impregnated for smooth meshing and minimum friction.

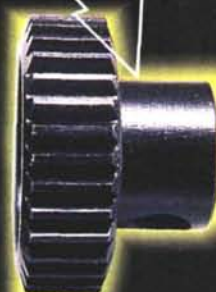


Brand "R"
...They have poor tooth finish and profile. They don't mesh well with the spur gear.

Trinity Zero Gravity™ Pinions Are Super Light!



Brand "R" Pinions Are All So Over-Weight, Power is Reduced!



From Magic Motor Sports

\$5.99

In 48 pitch from 12 to 30 teeth • In 64 pitch from 15 to 50 teeth



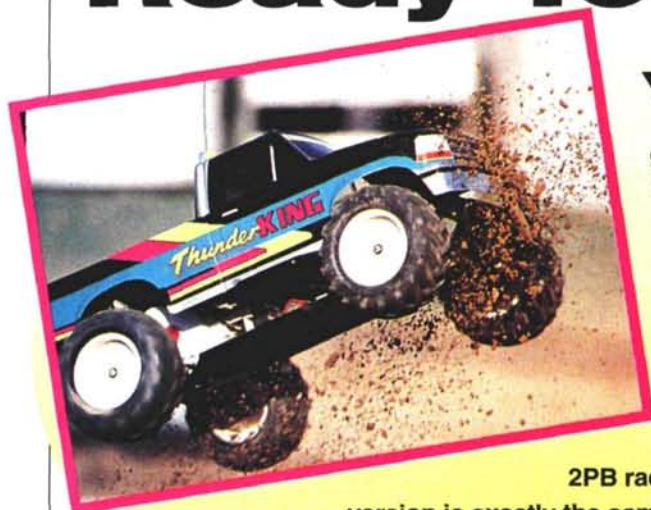
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We Are Your Source for ALL R/C Racing Needs

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Ready-To-Rock

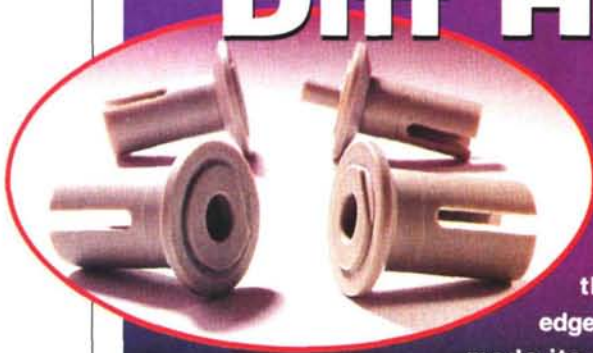


You've been reading about the large, rugged World Scale vehicles in the pages of *Car Action* for many months now. Well, those of you with limited spare time (doctors, lawyers and those with demanding social lives) should like this one. MRC has introduced the World Scale Thunder King R-T-R (ready-to-run) truck with an installed Futaba



2PB radio. The R-T-R version is exactly the same truck that's built from the kit version. It has a twin motor drive, ball-bearing Power Command™ tranny, adjustable slipper clutch, adjustable ball diff and oil-filled coil-overs.

"Team Driver" Composite Diff Hubs



Racers competing in national- and world-level events demand the best parts for their cars—anything that will give them the edge. Factory Works has just made its new line of high-end, aerospace-composite diff parts available to the public, so if you're constantly whining, "If I just had the parts that the pros have, I could smoke those guys," you now have no excuse.

Not intended to be used by hobbyists or club racers, these outrives lower the diff's rotating mass in your Stealth or Double-X gearbox by a substantial amount. In addition, they're reported to reduce the car's dogbone/outrive friction.

Diff halves are also available for the Yokomo Works '93 and A&L's Lethal Weapon 2. Factory Works parts are distributed exclusively by A&L Mfg., P.O. Box 2115, Corona, CA 91718; (714) 735-5249.



Heli-Herring



Chopper-Soup



Rotor-Head

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah of Radio Controlla chooses your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1993. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



THE MOD CLOD

Noah Morales' sharp-looking Clod Buster has been modified to a point at which it might no longer even be considered a Clod. It's tricked-out with an ESP aluminum chassis and long-wheelbase kit, eight DuraTrax oil-filled shocks, upper and lower front and rear aluminum bumpers, an aluminum roll bar with four RAM lights, an RAM headlight kit, Pro-Line tires with foam inserts, JPS aluminum wheels, Thorp differential gears in both gearboxes, a Trinity matched 4400mAh battery, a PDI Turbo Zeta ESC and Trinity Monster Mash motors. The mod list goes on and on. As Noah puts it, "I wanted it to stand out from the crowd." Well, Noah, I guess you accomplished your goal. But the question is: what do you do for an encore?



TRICKY DICK

This bad-lookin' LX-T comes from Redlands, CA. Dick Becker not only built his truck, but he painted the trick-looking body, too. The truck is equipped with a Novak 410 M5 ESC, Deans Ultra plugs and a Team Losi Double Trouble short stack stock motor. To control the truck, Dick uses a Futaba Magnum Sport radio. Locals had better watch out for him at the tracks!

BERLIN BOPPER

Herman Chan of San Francisco, CA, sent us this photo of his Tamiya 1/10-scale Mercedes 190E Special Edition, "Berlin 2000." The car is powered by a Trinity 13T modified motor and a Futaba 210B speed controller. The car is also equipped with aluminum front and rear suspension arms, working headlights, custom chrome wheels by Chrome Tech USA, factory brake lights and full ball bearings. Herman thanks his friends Stephen and Thomas for all their help.



FIRST LOVE

Nick Pantzoni of Austintown, OH, sent us this photo of his first buggy. It's stock right now; he has no moola for mods yet. It has a \$12 manual speed controller and a sluggish battery pack, and Nick is looking forward to modifying it soon. Even though it's a stocker, the pearl-white paint with candy blue and purple plaid striping makes it a stunner. Welcome to the wonderful world of R/C, Nick!



TROUBLESHOOTING

by FRANK MASI

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Team Car Bearing Failure?

I run an Associated RC10 Team Car with a Futaba Magnum Junior radio and a Novak 410 MXc ESC. I've been having a problem with the rear wheel bearings. I clean them with Paragon motor wash and oil them with Mobil 1 oil (this procedure was recommended by Associated's customer service). My car is still experiencing bearing failures. My Team Car has 3 degrees of toe-in at the rear tires. Will this affect bearing life?

A past "Racer News" section of *Car Action* mentioned a Schottky diode used with a Novak speed controller will improve braking. Can you tell me the value of this diode and how it's connected?

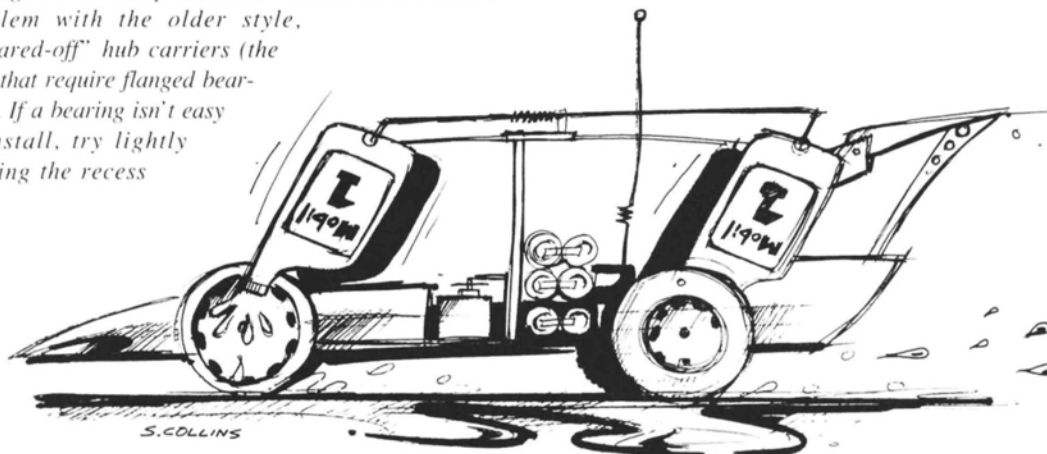
I love your mag; it's my only source of ideas and technical advice because the closest hobby shop is at least 400 miles away.

JOHN LOOS
British Columbia, Canada

The Team Car's rear hub carriers use low-profile, metal-sealed bearings that keep weight low and place the axle center close to the rear arm's outer pivot point. Unfortunately, these bearings aren't as rigid as the larger ones. The bearings are pressed into hub-carrier recesses that must be perfectly round; otherwise, the bearings can be easily distorted. This is a more common problem with the older style, "squared-off" hub carriers (the ones that require flanged bearings). If a bearing isn't easy to install, try lightly sanding the recess first.

Associated has recently upgraded its hub carrier molds. They're more precise, and they use unflanged bearings (like the bearings used on the RC10T truck). You can identify these carriers by their "rounded-off" look. I haven't had any problems with them yet. They're available with zero degrees of toe-in (part no. 7365), 1 1/2 degrees (part no. 6366) and 3 degrees (part no. 7358).

Believe it or not, the Schottky diode is an important part of Novak's high-frequency speed controllers because it suppresses motor noise and helps prevent motor arcing. Normally, this diode is located inside the ESC, but certain conditions, e.g., the use of hot modified motors and heavy brake use, could heat up the Schottky diode. This heat is transferred to the ESC's brake FET, making the ESC's brakes "fade." To solve this potential problem, Novak removed the Schottky diode from the inside of the ESC and soldered it to the motor tabs; this allows the brake FET to remain cool. By removing the diode from the circuit board, Novak was able to install a second brake FET (in the 410-HPc and M1c) for even more braking power. Novak says that you can use an external Schottky diode on any of its forward-only ESCs, but it should never be used with reversing ESCs.



Radio Static

I have an RC10 Team Car (aluminum chassis) and its setup is as follows: a Futaba Magnum AM (EP-12PD) radio and S9101 servo. The Futaba EP-R112JE receiver is mounted just behind the antenna on the shock tower. I also have 1400mAh SCR packs along with stock motors. My problem is that I get radio interference (glitches) often, and I can't find the source of the problems. The glitches occur no matter how far away the car is. I have a Novak NR-2X receiver; should I use it? Also, when I don't have a motor in the car and I turn the car on, it still glitches.

Does this have anything to do with my motor's capacitors? Is my speed controller not properly adjusted? If it is my capacitors, what kind and how many should I have for a Tekin 411P speed controller, and how should they be installed?

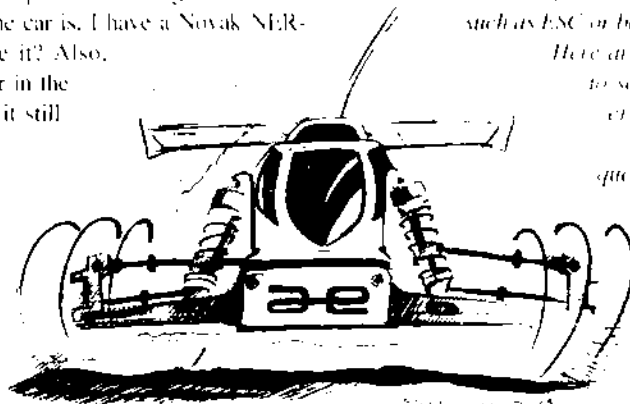
MARK AGUILAR
Missouri City, TX

Whenever I read a letter from someone whose car suffers from radio hits or glitches, the first thing I tell them to check is the motor capacitors. You've stated that this problem occurs even when the motor isn't installed, so we need to look elsewhere for the culprit.

The most common mounting position for the receiver in the Team Car is on the right side of the battery pack, just behind the antenna mount, but attaching the receiver to the shock tower will also work well. The main objective in mounting a receiver is to keep it away from the motor (it generates noise that can interfere with radio signals) and any current-carrying wire such as ESC or battery leads.

Here are some possible trouble areas to scrutinize: try obtaining another set of crystals (they don't have to be the same frequency, but they need to be on the same band, i.e., 27 or 75MHz), because a cracked or damaged crystal can cause the type of interference you've described. Also, you can try mounting the receiver further from the motor, or routing your battery and ESC wires so that they are as far away from the receiver as possible. If all else fails, send the transmitter and receiver back to the manufacturer for a tune-up.

For Tekin and most other high frequency electronic speed controllers, three 0.1-microfarad 50V ceramic capacitors (one from the positive lug to the motor can, one from the negative lug to the motor can and one between the positive and negative lugs) will work well.



Engine Quandary

A month ago, I bought a Kyosho Rampage truck from Hong Kong. This is my first gas truck, and I love it. But then I found out that the engine that came with the kit was a Kyosho GS-11 CR engine, not the O.S. CZ-R 12 like those sold in the U.S.! My friend told me that the O.S. engine is far more powerful (thus, faster) than my GS-11 engine. Is this true?

I am using 15-percent-nitro fuel now, and I want to boost the power of my GS engine by using competition nitro fuel. Do I have to adjust the settings of my engine every time I use a dif-

ferent grade of nitro fuel?

The instruction manual in my Rampage kit said that a proper setting is achieved when "the wheels do not run, yet the engine does not quit," but sometimes the engine idles smoothly, then suddenly the clutch bell engages without me pushing the throttle. Why?

I'm new to gas cars, and I need all the expert help I can get. Great mag! keep up the good work.

KIEREN AU
Alhambra, CA

From experience, I can tell you that the O.S. CZ-R 12 is more powerful than the GS-11. First of all, it's a bit larger, but the real difference is that the O.S. is much more popular here in the States, so there are plenty of after-market parts and accessories for it, e.g., the DualFray heat-sink cylinder head and slide valve carb.

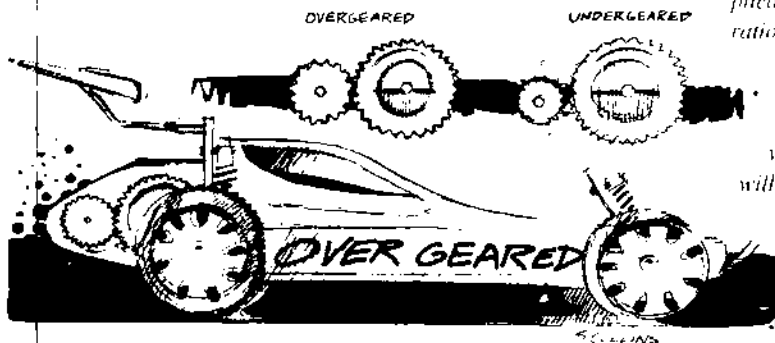
You'll need to adjust your carb settings when you change the nitro content of the fuel you're using. If you switch from a lower percentage of nitro to a higher one, you'll need to set your idle lower. You'll probably also need to richen-up the engine's high end adjustment to keep the engine running in the proper temperature range, because high nitro fuels will cause the engine to run hotter.

It sounds as if it's time to perform a little maintenance on your clutch. Remove the clutch bell and inspect the inner surface for excessive wear or burrs. Examine the clutch shoes; if they show signs of significant wear, they need to be replaced. Also, it's a good idea to replace the clutch spring every so often, as it determines when the clutch shoes engage the clutch bell.



What's Over-Gearing?

I recently read an article in your magazine that mentioned over-gearing. What is over-gearing and how can I prevent it or detect it? I also have a question about a charger: should I



go with the Tekin BC100L or the Novak Digi-Peak Plus charger? Can you please help? Keep up the awesome magazine.

ERIC MAHER
Saginaw, MI

Good question, Eric. Over-gearing occurs when the gear ratio you use is too low for the type of motor that you use, the track conditions, or the battery that's in your car.

Here's an example of an over-geared car: a good gear ratio for an Associated Team Car with a stock motor is 7.7:1 (82-tooth spur gear divided by a 24-tooth pinion gear, multiplied by the Stealth transmission's output ratio of 2.25). This ratio ensures lots of low-end "punch" and a good top speed.

To over-gear this car, change to a much larger pinion gear, such as 28-tooth; this alters the final drive to a much lower 6.6:1 (82/28x2.25). The car's top speed will greatly increase, but in most cases, low-end power will be reduced. Also, when a motor is over-gearred, it will run much hotter, and it will drain your batteries much more quickly.

Knowing this, why would anyone over-gear his car? On tracks that have very long straightaways, over-gearing for top speed can be advantageous. You'll find, however, that to make the run time, you'll need to drive the car at partial throttle through the infield and only pull full throttle on the straights.

Regarding your charger question, I can only suggest that you go with the brand you feel most comfortable with. Both the Tekin BC100L and the Novak Digi-Peak Plus offer many of the same features, e.g., adjustable pulse and linear charging. The Novak has an LCD display, but the Tekin is a little less expensive.

Outlaw Ultima Transmission Switch

I've owned a Kyosho Outlaw Ultima Truck for two years. For a while, I have been looking for a 48-pitch gear transmission. The guys at my hobby shop say that the Robinson Racing 48-pitch conversion for the Ultima won't work with my truck. They also say that the Kyosho Triumph tranny will fit my truck, but I've heard good and bad things about the Triumph transmission. The December '92 "Racer News" section of *Car Action* said that Kyosho may introduce a transmission similar in design to Associated's Stealth. Do you know anything about this? Also, can I charge a Trinity 6-cell 1700mAh pack and a Trinity 6-cell 1700mAh pushed pack with an Astro Flight 114 charger? Can you help me?

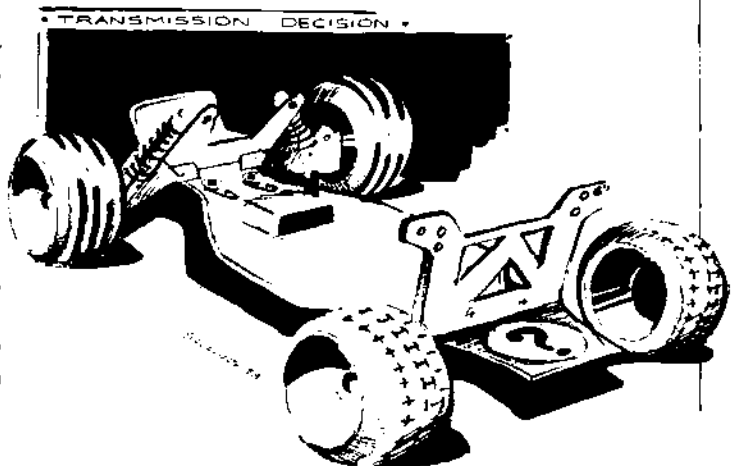
ALEC FROST
Woodridge, IL

I think that your friends are pulling your leg, Alec, because as far as I know, the Outlaw Ultima truck uses exactly the same transmission as the Ultima buggy on which it's based. This means that the accessories that fit one of them will, no doubt, fit the other, including the Robinson Racing 48-pitch gear conversion. Of course, you'll want to make sure that you're using the highest gear ratio possible because of the Outlaw's big truck tires.

A week ago, I would have told you to consider the Triumph tranny, it was a logical upgrade for Ultima owners, but forget about that now! Kyosho has just come out with its own gear-drive tranny for its new (as yet nameless)

2WD racing buggy. The really good news is that you can easily bolt this box to any Ultima-based Kyosho car. As I write this, all I know about this transmission is that it's called the "SST," it uses a center-mounted, externally adjustable ball diff, and it also features a friction-type slipper clutch.

Yes, you can charge virtually any Ni-Cd battery pack with an Astro Flight 114 charger. According to the manufacturer, it will take about 20 minutes to fully charge a pack of 1700mAh batteries using the 114. For safety reasons, though, never leave a charging battery pack unattended, because it could overcharge and vent harmful gases or even explode.





PHOTOS BY WALTER SBAE & JOHN HOWELL

E V E R Y T H I N

TRAXXAS

TRX-3

by FRANK MASI

TRAXXAS* RELEASED its TRX-1 racing buggy on an unsuspecting public late in the '91 season—an act that raised the eyebrows of quite a few manufacturers, especially when one of the prototypes landed in fourth position on the starting grid at the '91 IFMAR World Championships.

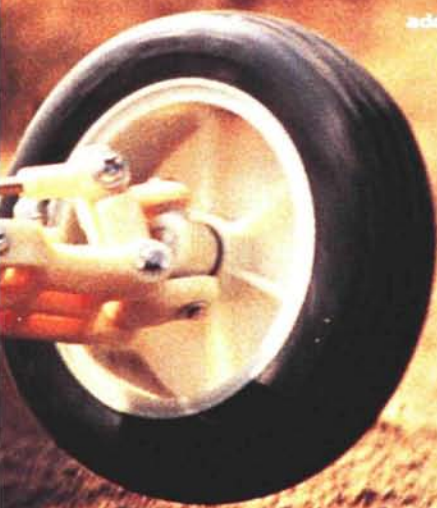
Since its debut, the TRX-1 has proven to be reliable, fast and capable of beating the stiffest competition. Continuing R&D of this top-line buggy has led to a brand-new version: the TRX-3. (What happened to number two? It's a very long story.) The TRX-3 is the same car that team driver Rick Vehlow used to win the '92 ROAR National Stock championship.

GIVE 'EM WHAT THEY WANT

The TRX-3's design is the result of input from not only the team drivers but also from many TRX-1 owners. People wanted a faster steering response from their cars. The original TRX-1's graphite chassis—jokingly referred to as the “limo chassis”—had a very long wheelbase that worked well on wide-open, fast tracks, but responded sluggishly on tighter tracks. A chassis was made that was 10mm (roughly 1/2 inch) shorter, which allowed a very quick response. Instead of graphite, Traxxas uses their dual-plane, fiberglass Zero Flex design for the new TRX-3, and for added rigidity, the upper and lower plates are joined using a set of molded side plates.

FRONT SUSPENSION

To improve steering response, the front suspension arms of the TRX-3 are shorter than those of its predecessor—63mm (1 1/4 inches) compared with 88mm (2 1/4 inches). Short arms allow the car to recover more quickly from chassis roll, and this makes transitional handling more accurate. (The short arms can also be used on the TRX-1.)



G I S M O R E

TRAXXAS TRX-3

The TRX-3's front suspension bulkhead narrows its front end even more. The inner hinge-pin mounts are $\frac{1}{8}$ inch closer together than those on the TRX-1's bulkhead. With the new arms and the bulkhead, the TRX-3's front-wheel width is $9\frac{3}{8}$ inches, while the old car's width was $9\frac{7}{8}$ inches. The new bulkhead is bolted to the upper and lower chassis plates, and it has 30 degrees of kick-up (rake angle) built in. Although it would be easy to make bulkheads with various amounts of kick-up, as of this writing, Traxxas doesn't plan to do this. I've noticed that the front-arm, inner hinge pins line up perfectly with those of the rear arms. Traxxas isn't saying anything, but I wonder if this was done for a specific purpose. Hmmm.

All-new caster blocks reside at the ends of the front arms. The blocks on the preproduction version shown in the photos have 30 degrees of caster, which, I believe, will be standard on the full-production car. As an option, Traxxas will offer blocks with 25 degrees of caster for more low-speed steering. You can mount the upper camber rod in one of two holes in the caster block.

The steering block's height in relation to the caster block can be altered by changing shims. According to Traxxas, this adjustment is used to maintain the proper ride height when the size of the front tires is changed. Raise the axle blocks when you use

With its shorter wheelbase and narrow front track, the TRX-3 is designed to turn much more tightly than its predecessor—the TRX-1.

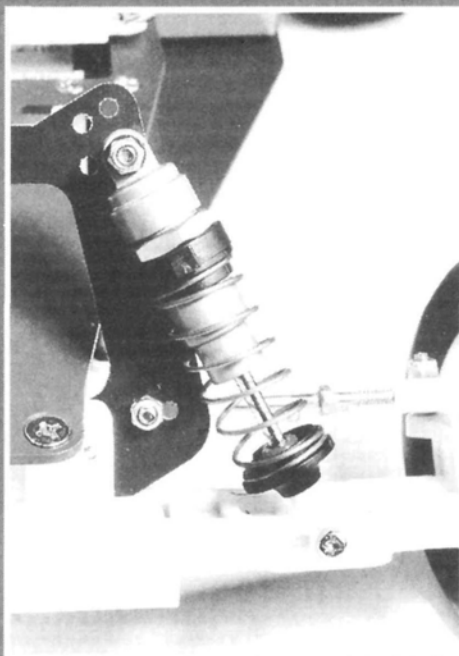
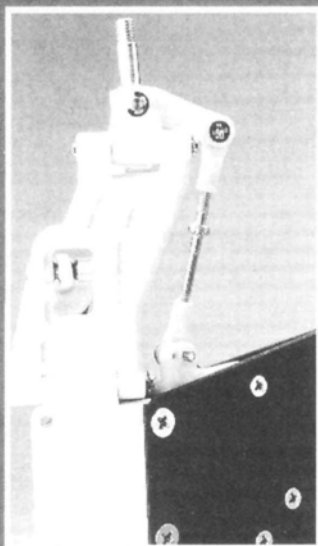
that a lot of time was spent "fooling" with the inner camber-link positioning to achieve the best balance of quick steering and stability.

NEW SHOCKS

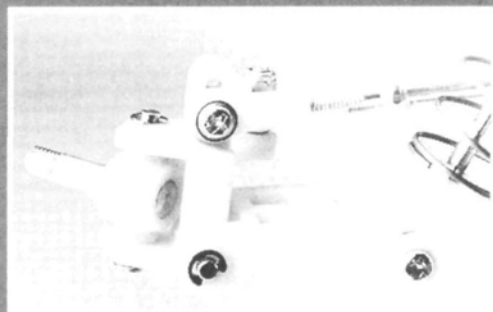
large tires, and lower them when using smaller tires. I suspect that this adjustment has something to do with camber-rod angle. By raising or lowering the front axle in relation to the outer camber-rod mounting position, you subtly change the car's roll center. I've been told by Traxxas

New shocks adorn all four corners of the new Traxxas buggy. The shocks feature larger-diameter, hard-anodized, Teflon-coated bodies and new shock pistons. Older Traxxas shock pistons were notched to allow them to move through the shock oil. The new pistons have beveled edges for smoother operation and holes through which the oil can flow—a much more precise way to control damping. Traxxas believes that a larger volume of oil in the shock will make its damping less susceptible to change caused by friction-induced heat.

Shorter front arms help the TRX-3 respond more quickly to steering input. These arms can also be bolted directly to the TRX-1. All of the TRX-3's suspension pieces are molded of a new, stronger, nylon composite material.

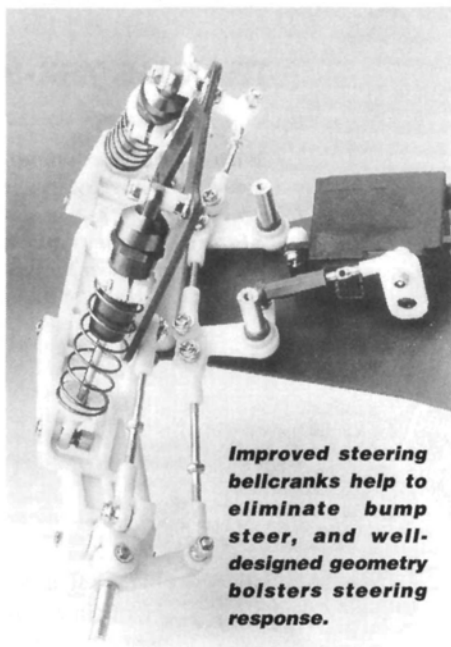


Left: here's a close-up look at the TRX-3's new, larger-diameter, hard-anodized, Teflon-coated shocks. Traxxas's X-tra Long units are used in the rear and their new Medium-Length shocks go up front.



Above: all-new hub carriers feature a choice of holes in which to mount the upper camber link. The axle block can be shimmed to alter ride height.

TRAXXAS TRX-3



Improved steering bellcranks help to eliminate bump steer, and well-designed geometry bolsters steering response.

Traxxas's X-tra Long shocks are used in the rear, and their all-new, Medium-Length shocks are attached to a completely redesigned, thick, fiberglass, front shock tower. The tower features an upper cross-brace that adds to its strength. Apparently, the length of a car's front shocks has a pronounced effect on its fore-to-aft weight transference. The shorter shocks allow the car's weight to transfer more quickly to the front wheels for better turn-in.

IMPROVED STEERING

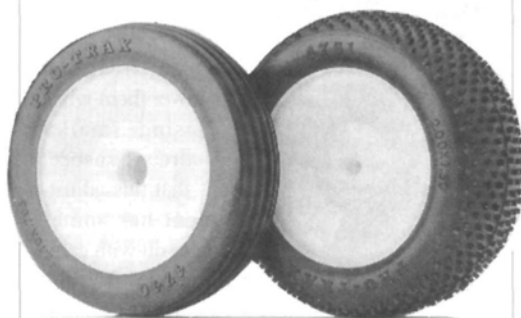
New steering bellcranks include repositioned inner steering-rod mounts, which are farther away from the bellcrank's pivot axis. The bellcranks are also mounted on the chassis so that they're much closer to each other. This improved geometry virtually eliminates bump

steer and places the front wheels at optimal angles during cornering. The bellcranks pivot on polymer bushings that can be upgraded to 5x8mm ball bearings.

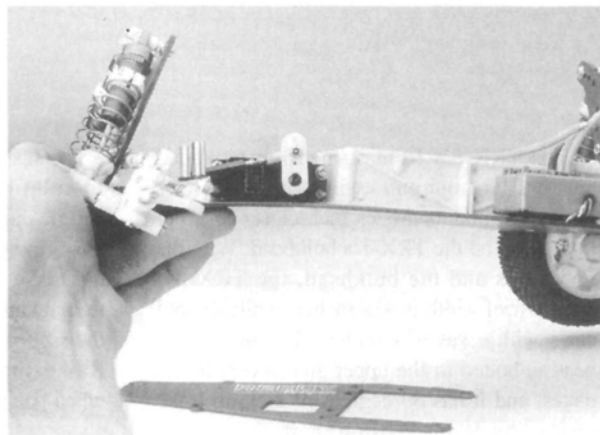
REAR SUSPENSION

The rear suspension remains similar to that of the TRX-1, but a new transmission bulkhead with improved camber-link mounting positions has been designed. Tubes are now used to retain the wing, instead of the old method of securing it to the shock tower.

Zero-degree inner arm mounts are used. Rear suspension arms with 3 degrees of toe-in are standard, and they're attached to a pair of zero-degree hub carriers. Shims are placed under the inner arm mounts to give the TRX-3 exactly 3 degrees of rear anti-squat. The rear



Although they're the same diameter as the original TRX-1 rims, these new rims have smooth faces to help keep dirt from collecting inside.



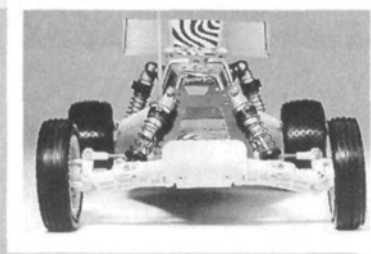
With the upper plate removed, the fiberglass lower plate flexes easily. Install the plate, and I dare you to flex this thing!

anti-squat angle can be changed by varying the number of shims placed under the rear arm mounts. Toe-in settings can be altered by using the optional "plus or minus" rear arm mounts. Depending on how they're mounted on the chassis, these mounts can either add 1 degree of toe-in to the rear suspension or subtract 1 degree.

NEW TRANNY CONFIGURATION

I had heard rumors of a completely new transmission for the TRX-3, but they've proved to be at least partially unfounded. The TRX-3 features a re-configured version of the TRX-1's tranny. The internals are the same (the tranny still has a 2.14:1 ratio), but the diff, the center idler gear and the top input shaft have been "stacked" in a more upright position so that the motor can be mounted closer to the car's center. The drive-shaft outputs are lower than before, so the shaft's angle of deflection is less severe. This means less

TRAXXAS TRX-3



Scale1/10
Price\$300

DIMENSIONS:

Overall length15 in.
Width9.625 in.
Wheelbase*10.5 in.
Front track8.4 in.
Rear track7.9 in.

WEIGHT:

Gross (with batteries)3 lb., 8 oz.

CHASSIS:

TypeDual-plane plate
MaterialFiberglass

DRIVE TRAIN:

TypeSealed gear

PrimaryPinion/spur
DifferentialAdjustable ball
Bearings/bushingsBall bearings

SUSPENSION:

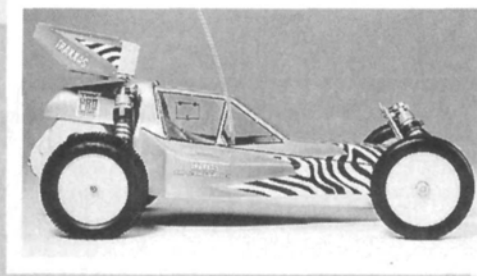
Type (f/r)Independent A-arm w/upper
camber link
Damping (f/r)Oil-filled, coil-over shocks

WHEELS:

Front: TypeOne-piece molded
Dimensions (DxW)2.2x.875 in.
Rear: TypeOne-piece molded
Dimensions (DxW)2x1.375 in.

TIRES:

FrontPro-Trax 4740 ribbed
RearPro-Trax 4751 mini-pin



drive-shaft binding under acceleration. The parts for this modification include a new set of gear cases, a new motor-mounting plate and a new gear cover.

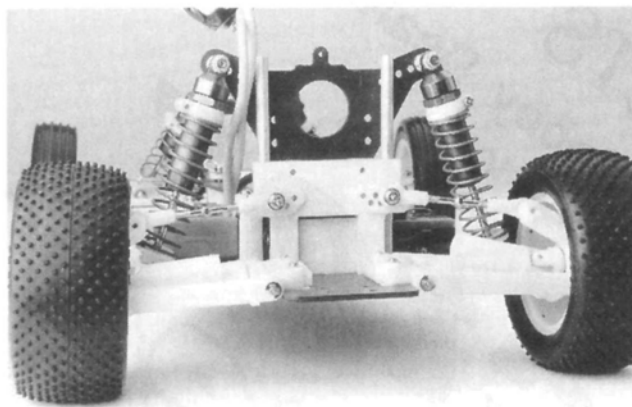
The TRX-3 retains the molded universal-joint slider-shafts used on the TRX-1 and most other Traxxas off-road vehicles. Sliders seem to allow the suspension to perform better on bumpy tracks, while universal-joint, dogbone-style shafts tend to keep the chassis flatter on smoother, high-speed tracks.

THE COMPLETE PACKAGE

As with many preproduction cars, the TRX-3 I received was assembled by Traxxas, so I can't tell you how well it went together because I didn't build it! I have taken the car apart and put it back together quite a few times, and I can safely say that the parts are of very high quality and that they fit together nicely.

I find it interesting that there aren't any self-tapping screws on this car. (The TRX-1 uses self-tapping screws for many of its molded parts.) I asked Traxxas about this, and they replied that machine-thread screws are less likely to loosen and fall out during a race than self-tapping screws.

The TRX-3 comes with new front and rear rims. They are the same size as the standard Traxxas rims (2-inch-diameter rears and 2.1-inch-diameter fronts), but they have smooth outer surfaces so that less dirt will be able to collect inside.



A redesigned rear bulkhead features wing tubes and better camber-link placement.

I set the car up with KO Propo's* PS1001 steering servo that was wired into the voltage regulator of Novak's* latest and greatest 410-HPc electronic speed controller. I opted to swap my JR Propo* R-756's stock receiver for a lighter, more compact Novak NER-TFM 75MHz receiver. I soldered a set of six matched, conditioned Sanyo 1700mAh SCRC cells supplied by Reedy* and hard-wired them to the HPc. Reedy also supplied the horsepower in the form of its new Force II Outlaw Stock motor.

The old TRX-1 body was a "love it or hate it" affair. This new TRX-3 body will appeal to many more people, because it's more conventional looking. I find its appearance super-trick, especially after my buddy Dana at Airworks* got through giving it a "nightmare on the Serengeti" paint job. The new body fits closely to the chassis to seal out dirt and debris.

(Continued on page 94)

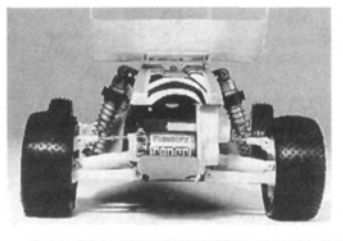
ELECTRICS:

Motor, batteries, speed controller.....
Not included

OPTIONS AS TESTED:

JR Remote Control R-756 transmitter; Novak NER-3FM receiver; KO Propo PS1001 FET servo; Reedy Force II Outlaw Stock motor and matched 6-cell 1700mAh SCRC pack.

*Measurement taken at normal ride height



HITS

- Excellent blend of stability and steering
- Superbly rigid, dual-plane fiberglass chassis
- Clear, concise instructions with helpful tuning guide
- Smooth new shocks
- Improved performance for less money

MISSES

- Front tires provide inadequate steering on slick tracks
- Front bulkhead kick-up not adjustable

TRINITY[®] Evolution 10

MAGIC TRICKS

by Joel "Magic" Johnson[®]
current IFMAR World Champion

Last month, we talked about little things that will make your EV10 run faster and handle better. We went over the reasons for using Zero Gravity™ pinion gears and Trinity lightweight EV10ss chassis plates. This time, we look at the EV10's front end.

A sliding-pillar front end is simply a steering block sliding up and down on a stationary kingpin, but the EV10's Reactive Caster Front Suspension System™ is as close to full-size-car technology as you can get in 1/10 scale (owing to weight restraints).

Because of the complexity of our system, which offers innumerable setup options, there are a lot of moving parts that will eventually have to be replaced as they wear. Too much slop in any suspension system, whether it's on an EV10 or an off-road car, reduces the effectiveness of caster, camber and toe-out adjustments and eliminates the effects of suspension travel.

If there's too much play, the suspension won't operate until the pressure and forces generated by the tires cause the suspension to reach a point at which there's no longer any play; then the suspension will start to work. At this point, it's usually out of adjustment and binding up. This makes your car react more slowly, act differently on each lap and generally handle poorly.

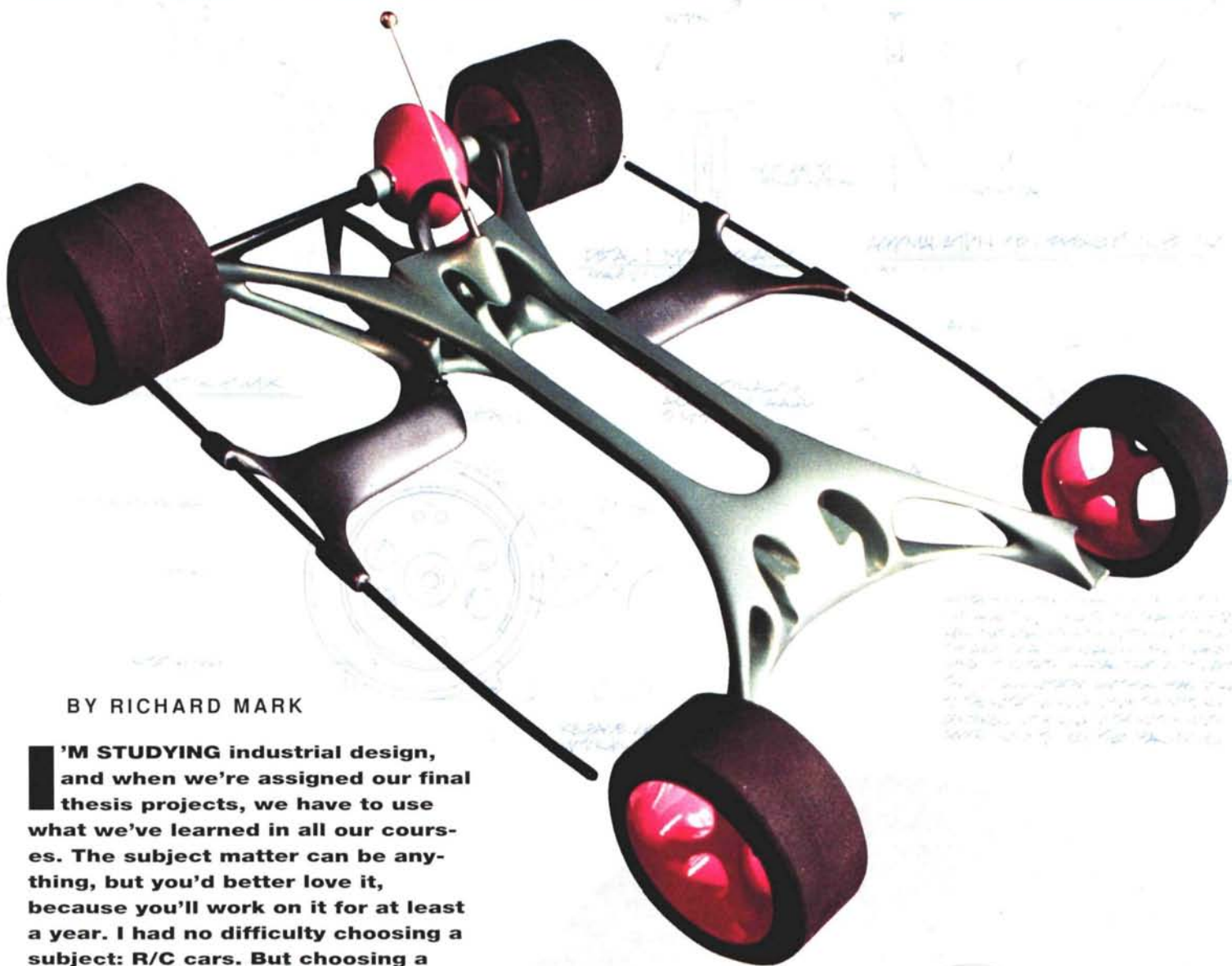
That's why you should keep the front end of your EV10 and EV10ss in tiptop condition. To make this job easier, we've come up with a front-end rebuilding kit for both cars. The kit includes all you need to make your car like new again. It includes steering blocks, bushings, kingpins, etc.

EV4052 Superspeedway Front-End Rebuild Kit—\$19.99
EV4053 On-Road Front-End Rebuild Kit—\$19.99

So, until next time, remember that when Jim Dieter designed the EV10 front end, it was to make a car that would corner faster. Keep that front end dialed-in, and your car will always handle great!

Joel "Magic" Johnson[®]

ADVERTISEMENT



BY RICHARD MARK

I'M STUDYING industrial design, and when we're assigned our final thesis projects, we have to use what we've learned in all our courses. The subject matter can be anything, but you'd better love it, because you'll work on it for at least a year. I had no difficulty choosing a subject: R/C cars. But choosing a type of car was more difficult.

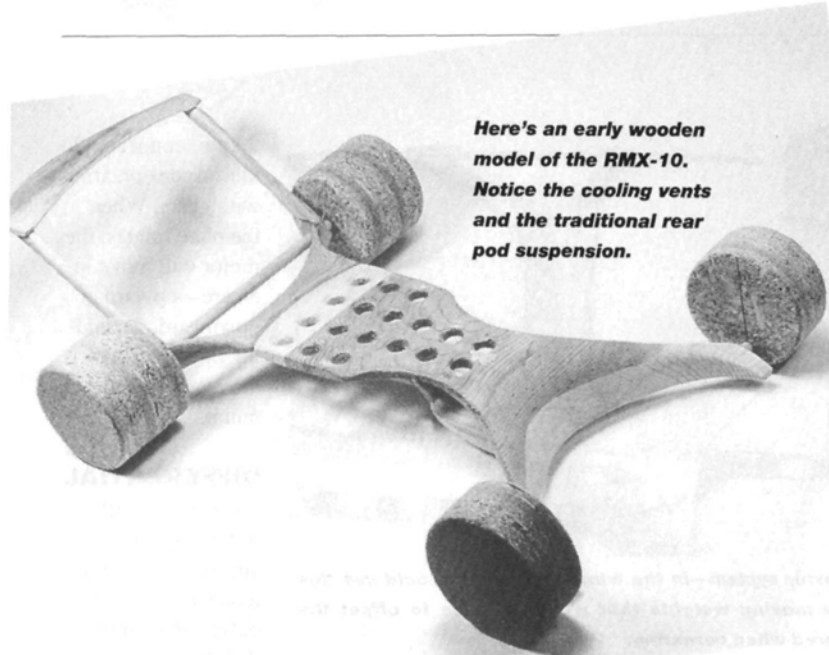
I wanted to design something new and test it against available kit cars. I thought an off-road car would be too complicated for the time and machine-shop facility available to me, so I decided to design a 1/10-scale on-road car.

CONCEPT

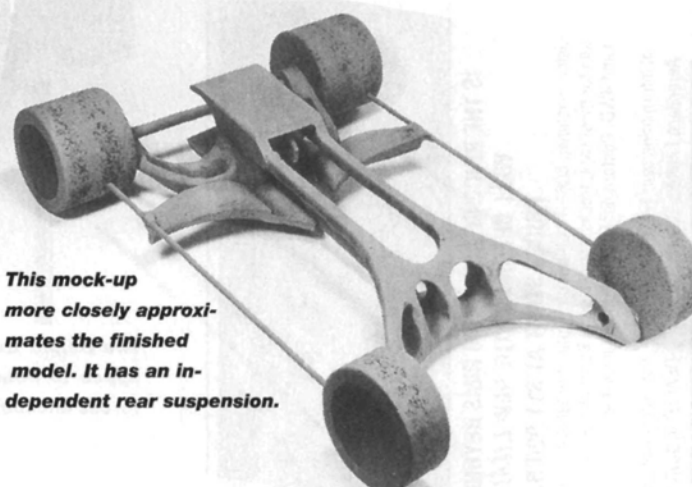
I planned the project in detail, but as time went on, it changed because I learned more about things such as the positioning of the electronics and mechanical systems. Designing an R/C car is very different from modifying an existing one.

RMX-10

CONCEPT CAR



Here's an early wooden model of the RMX-10. Notice the cooling vents and the traditional rear pod suspension.



This mock-up more closely approximates the finished model. It has an independent rear suspension.

It would have been easy to take parts from successful kits, put them together to form a car and call it my own, but I decided to design something that would be totally different. I think that an R/C car's identity comes from its chassis, so I decided to omit a covering or body. This meant that I had to take aerodynamics into account when designing the chassis.

The project took about 24 weeks to complete. The result wasn't what I had anticipated, but it is very different from existing kits. It's similar to the "concept cars" you see at auto shows.

DESIGN

At first, I made a simple model out of cardboard and wood. I checked it for problems, and then I made another model that solved those problems. It took 12 models to arrive at the final version, and I never made a functional prototype, so my design remains untested. Nevertheless, I hope you'll find my ideas interesting.

SUSPENSION

The chassis influenced the suspension design. To save weight, I took material out of the middle of the chassis; this determined the shape of the A-arms. The rear suspension arms look like the front A-arms, and this produces the "X" chassis form.

To keep the suspension arms looking clean, I decided not to use bulky coil-over shocks. Damping is provided by elastomer (a polymer that's as elastic as rubber) bumper disks. (Mountain-bike suspension systems use this material.) To vary the damping, you change the bumper disks; disks made of a harder elastomer provide stiffer suspension; softer disks...well, you get the idea.



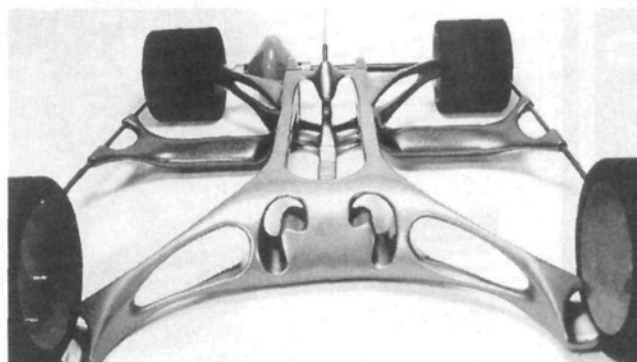
To save weight, I made cutouts in the front arms, and this gave me ideas for making the A-arms and suspension.

WEIGHT TRANSFER

The car's side wings serve three purposes:

- They hold the nerf bars.
- They act as spoilers to produce downforce.
- They shift weight when the car corners.

There's nothing new about a rear spoiler, and I wanted to make something really different, so I made the wings act as spoilers.



The front suspension of the final design.

"I think that an R/C car's identity comes from its chassis, so I decided to omit a covering or body. This meant that I had to take aerodynamics into account when designing the chassis."

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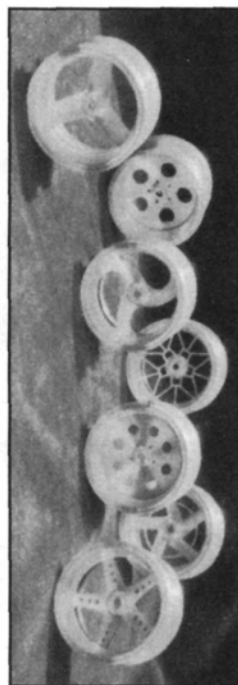
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See pages 189-198

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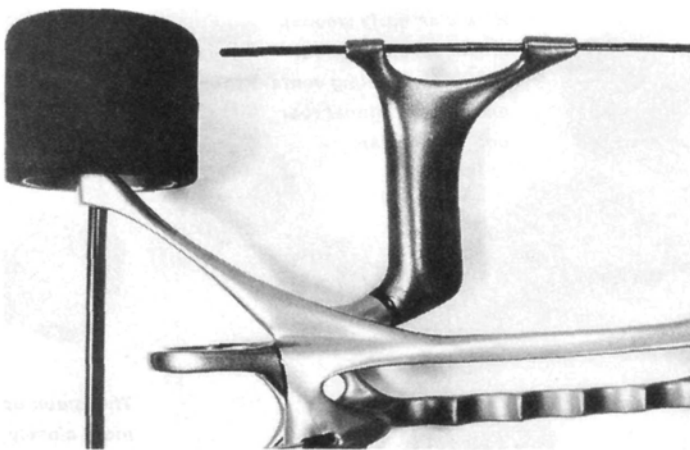
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619 443-2270

RMX-10



The weight transfer system—in the wings. I thought I could use this space to house moving weights that would be able to offset the forces encountered when cornering.

To save weight, I took material out of the middle of the wings, and that gave me the idea to put a moving weight inside. The weight can be shifted to reduce the chassis' weight transference, and it's controlled by the servo by means of pulleys and cables. When the car turns, the servo spins and pulls the cable, which pulls the weight inside the wings.

REAR AXLE

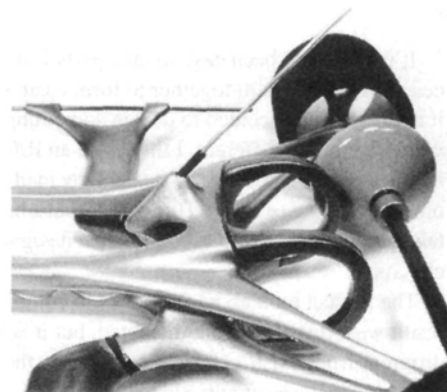
To make an independent rear suspension and a solid rear axle work, several things must happen. As the suspension arms move upward, the axle will be at an angle, so the inside of the arms must pivot. I designed a round bearing carrier that pivots as the arm moves.

The gears must mesh throughout the suspension movement, so the motor must move as the rear suspension arms move. Theoretically, this should be possible if you hold the motor between two plates that rotate as the suspension arms move because

they're connected to the suspension arms with gears. When the plate rotates, the motor will move in an arc—upward or downward, depending on which arm moves and how much.

DIFFERENTIAL

I wanted the diff to be long-lasting and virtually maintenance-free, so I designed a magnetic diff that was

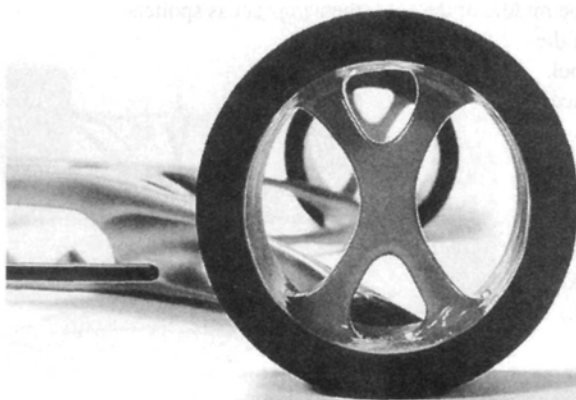


The motor holder and rear suspension. Note the raked antenna mount.

inspired by the anti-backlash mechanisms on fishing reels. To protect it from dirt and crash damage, it's enclosed in a cover. This looks "clean" and goes well with the rest of the design.

CONCLUSION

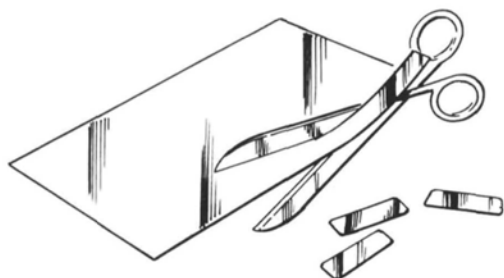
The final car might look cool, but if it can't perform, it's useless. The only way to assess performance is to test a working prototype, and I intended to do that, but so far, I haven't. If I did it, I'd probably follow a different direction by making something with high performance and mass production in mind. Remember, this design was only a school project, but I'm happy with the results. Perhaps some of my ideas will be used in competitive cars some day.



The wheels were inspired by the chassis' "X" form.

PIT TIPS

by JIM NEWMAN



LOW-COST BARS

Buy an inexpensive sheet of thin copper at a hobby store. Use shears to cut the sheet into 1/4x1-inch strips to make battery bars (one sheet is usually enough for about 40). Copper very quickly oxidizes, and that means high resistance, so coat the bars with a thin layer of solder before you use them.

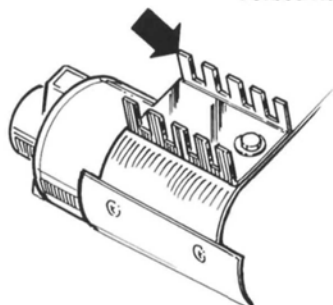
David Van Laningham, Lakewood, CO



TAPE HOLDER

If you don't have room in your box for rolls of tape, hang them on this simple holder made with coat-hanger wire and cord.

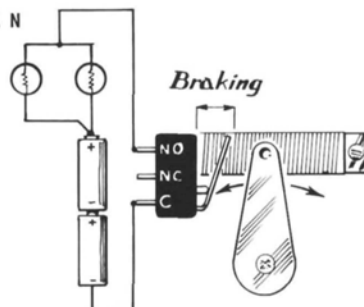
Forbes Husted, Mahwah, NJ



INEXPENSIVE HEAT SINK

You can mount this Radio Shack heat sink (no. 276-1363) on the Traxxas Bullet's motor plate, and perhaps others, too. Heat sinks only work well if they're in 100-percent contact with the heat source, so to ensure a good contact, put Radio Shack Thermal Heatsink Paste under the heat sink.

Marbenn Cayetano, Harker Heights, TX



RC10 BRAKE LIGHT

Mount a Radio Shack microswitch on the resistor bracket, set it to operate in the braking range, and use it to operate brake lights wired in parallel. If you use LEDs, limit the voltage to 3 volts (two cells) as shown, and wire everything across the common and normally open switch contacts.

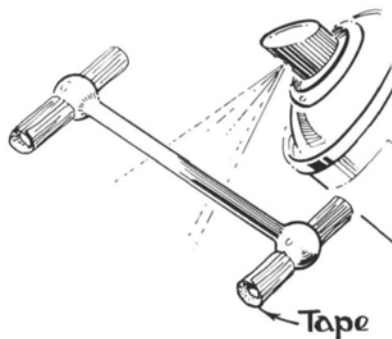
Brad Cobo, Duncanville, TX



AVOID SORE FINGERS

Cut half a finger off a rubber glove and stuff it with cotton or foam rubber. Force it over the knob on your transmitter stick, and secure it with a rubber band. Long-distance racing will no longer result in sore fingers.

Keith LaRoy, Whitehorse, YT, Canada



BRIGHTER DOGBONES

Spray your dogbones with bright paint such as fluorescent pink or yellow. If they happen to pop off, they'll be easier to see in the dirt. (Remember to tape the drive pins before you spray.)

Dennis Scheffler, Ronnenberg, Germany

PLEASE NOTE: be sure to print your name and full address clearly on every letter and sketch you send to "Pit Tips." We can't publish many good tips because we don't have the senders' names or addresses.

KYOSHO Inferno

BY WALLY CAHILL



INFERNO (in-fur'no): hot; scalding; blazing; searing; blistering; scorching; just do a wheelie; cremate the competition....

Get the idea? Just add "ST" to signify that it's a stadium truck, and you have the Kyosho's 1/8-scale, gas-powered stadium truck, which is based on their super-successful Inferno DX gas truck. A quick change of tires and body seemed to be all that was needed to make the Inferno DX a stadium schooner.

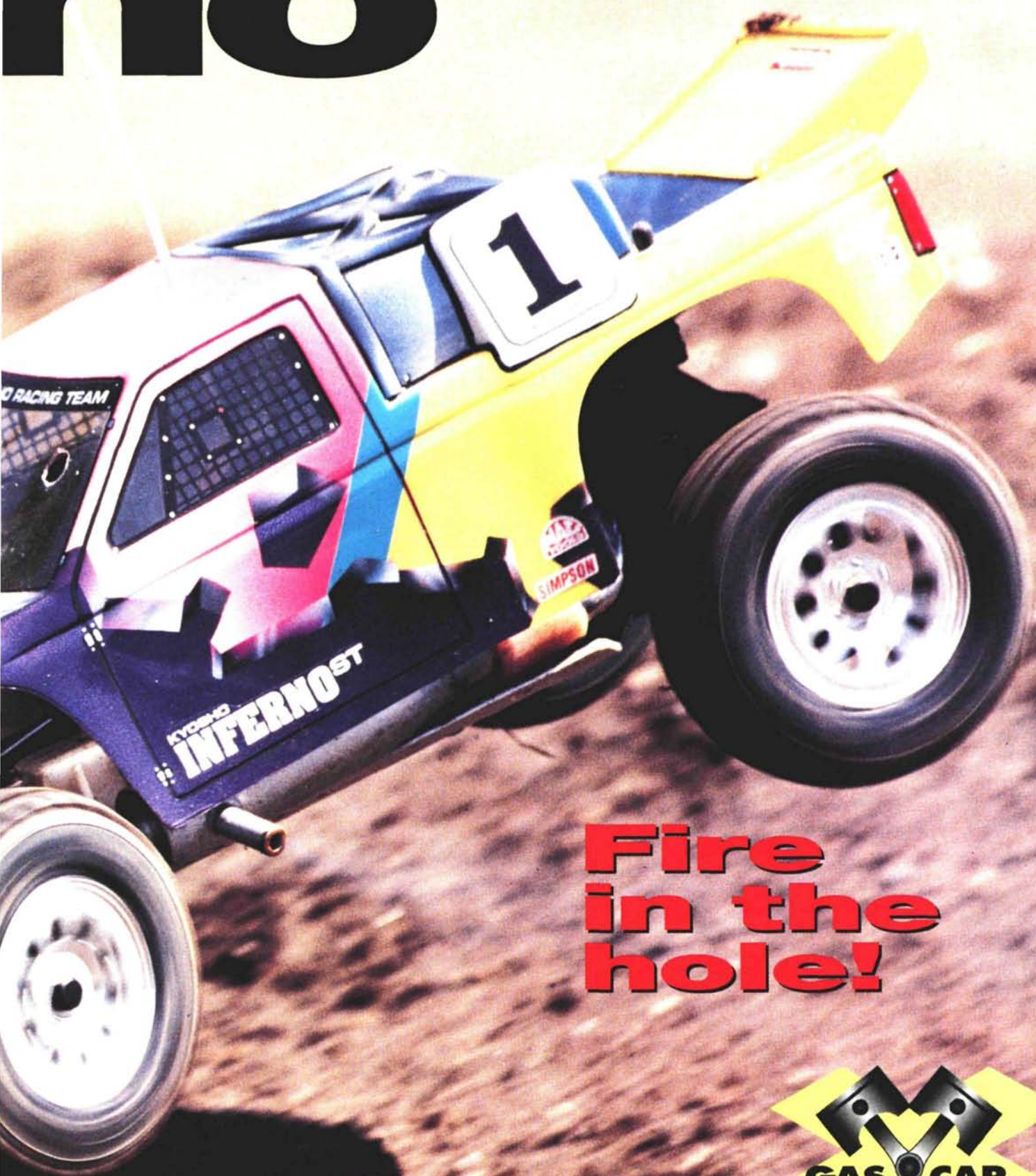
EMPTY POCKETS

We're all keeping an eye on our hard-earned money, so it's nice that Kyosho has kept the truck's price reasonable. We want everyone—not just the rich and famous—to enjoy the thrill of gas racing. This kit is zeroed-in on budget-minded beginners, but spend a few dollars on some hop-up goodies, and you'll be able to take on all comers.

While I was bench racing at my local R/C track, the subject of gas power came up. Having only a limited knowledge of gas, I kept quiet. (We all know it's better to be *thought* a fool, than to open your mouth and remove all doubt!)

PHOTOS BY J.R. HUBBARD

no



**Fire
in the
hole!**



KYOSHO INFERNO ST



Scale 1/8
Price \$499.95 w/out engine,
\$719.90 w/O.S. .21 RFB

DIMENSIONS:

Overall length 18.9 in.
Width 12 in.
Wheelbase 12.9 in.
Front track 10 in.
Rear track 10 in.

WEIGHT:

Gross 7 lb., 12 oz.

CHASSIS:

Type Plate chassis w/ upper radio tray
Material Aluminum alloy

DRIVE TRAIN:

Primary Pinion/spur/clutch
Transmission Center bevel diff
Differential(s) Bevel gear
Bearings/bushings bushings (95%)

SUSPENSION:

Front/rear:
Type Lower A-arm/upper adjustable link
Damping Oil-filled coil-over shocks

WHEELS:

Front and rear One piece plastic
Dimensions (DxW) 2.9x1.7in. (74x45mm)

TIRES:

Front Off-road block tread
Rear Off-road block tread

POWERPLANT:

Engine21 SRT
Pipe DuraTrax tuned pipe
Carb. SRT slide valve

OPTIONS TESTED: .21 SRT engine, Tekin FM mini-receiver, Futaba 9301 servos, Blue Thunder* 15-percent-nitro fuel, DuraTrax tuned pipe, K&N* foam air filter.

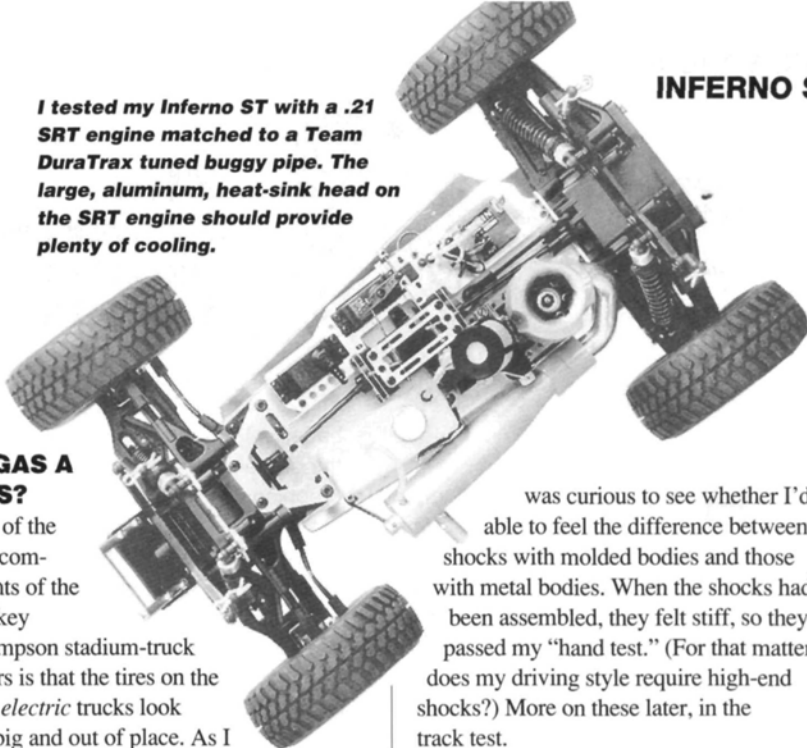
HITS

• Major speed • Durable and reliable • Reasonably priced for beginners • A lot of fun

MISSES

• Could use more detailed written instructions
• Takes patience to assemble its ton of components!

I tested my Inferno ST with a .21 SRT engine matched to a Team DuraTrax tuned buggy pipe. The large, aluminum, heat-sink head on the SRT engine should provide plenty of cooling.



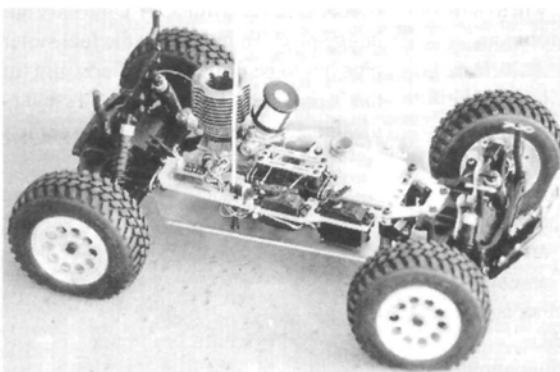
IS GAS A GAS?

One of the few complaints of the Mickey Thompson stadium-truck racers is that the tires on the R/C electric trucks look too big and out of place. As I opened the Inferno ST's box, its tires immediately caught my eye; they look more true to scale. Looking deeper into the box, I found the wheels—two-piece racing wheels just like the full-size ones.

It all looks straightforward enough. Now, where did those destructions—I mean instructions—go?

SAVVY SUSPENSION

Start by assembling the molded shocks. When assembling any shocks, it's always a good idea to carefully trim off all the flash-



The engine doesn't come with an air cleaner, so I bought a hot little foam unit. If you do the same, don't forget to oil it. Another thing on my list of hop-up items is a Kyosho flip-top fuel tank.

ing. These shocks were no exception, and they trimmed up quite nicely. Shock oil is supplied, and there's a double O-ring seal to help keep it inside the shocks (where it can do more than just make a mess!).

To ensure that the spring pre-load settings are identical on all wheels, they're set with a notch-and-pin-style adjuster.

The plastic shocks are one of the areas in which Kyosho has kept down costs, and I

INFERNO ST

was curious to see whether I'd be able to feel the difference between shocks with molded bodies and those with metal bodies. When the shocks had been assembled, they felt stiff, so they passed my "hand test." (For that matter, does my driving style require high-end shocks?) More on these later, in the track test.

MONGO ARMS DUDE!

The suspension arms are *big!* Compared with the ones on 1/10-scale electric trucks, they look as if they came off a Toyota truck, not an R/C truck. But they aren't all brawn and no brain; they sport some pretty fancy features, e.g., travel-limiting setscrews, which are screwed into the suspension arm and bottom-out on the chassis instead of the drive train.

I'm used to being able to adjust my caster/camber and toe-in/out at the track. Instead of turnbuckles, this kit's suspension linkage has a threaded rod, so try to keep all your measurements exact when you build them.

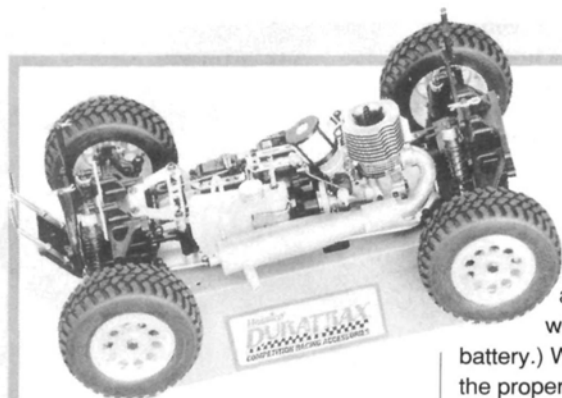
I was also a little confused about the instructions for the tie rods; why do they ask you to bend the tie rods at a 20 degree angle? (Anyone who has seen me drive would say the rods just look as if I've already driven with them!)

The front-end dogbones (where the driving and steering happen) should also have closer tolerances. To help out here, Kyosho put small,

rubber O-rings between them and the output drive.

The burly front end was as impressive as the rear end, but in both, we have to settle for bushings instead of bearings. This keeps costs down. Remember that this is a *budget* racer, and if you want to, you can upgrade the ST with bearings later.

At this point, I was successfully bolting pieces to the partially assembled chassis in



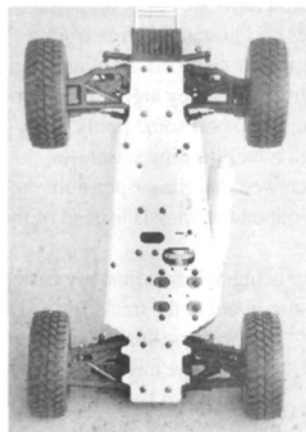
The Smarts about Starts

Have you ever tried starting your 1/8-scale buggy or truck with a hand-held wheel starter? It's a pain, isn't it! Well, Team DuraTrax now offers this great starter box, and if you own an 1/8-scale gas buggy or truck, it's a must.

It has a heavy-duty starter motor

and a rubber starter wheel. (You supply the battery.) With the alignment pins in the proper holes, it's just a matter of dropping your truck or buggy on top of the starter box, pressing down on the vehicle to activate the spring-loaded switch and away you roost.

You don't have one, you say? Well, you had better hurry up and get one. It's as necessary as air conditioning in a blazing Inferno!



The ST has the same aluminum chassis as the Inferno DX. The suspension arms are extremely burly, and you'd have to drive like a complete spode to break them.

fine order. Although they're precise and more than thorough, the instructions don't give enough guidance when "the obvious" isn't clear. One of the kit's many highlights is that all three diffs arrive assembled

and mounted on the chassis. Another is that everything fits together really well. (Kyosho's engineers have really thought this thing out.)

BEING FUELISH

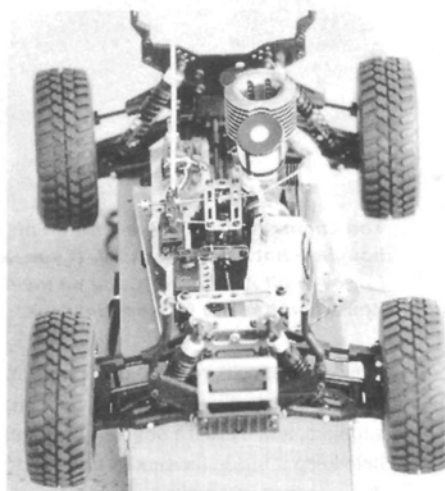
Before mounting the trick DuraTrax* .21 SRT engine on the chassis, I secured it to the two provided mounts. Remember to use thread-locking compound (included) everywhere the instructions call for it, i.e., on metal-to-metal joins.

The engine sports one of the largest heat-sink heads this side of Beaufort, NC—a "mild racing motor," according to the experts at my local hobby shop! The instructions for mounting the clutch were very clear, and it

fit without my having to do any creative cutting. (I love it when things fit the way they should!)

Before putting in the four screws that hold the engine on the chassis, I had to file the screw slots a little. This is described in the instructions, so it was a breeze. (Forewarned is forearmed!) Meshing the gears closely (a paper's thickness) and tightening the screws took care of the engine mounting.

On to the exhaust, where a Team DuraTrax header is mated with a .21 DuraTrax tuned buggy pipe. To pressurize the fuel system, the pipe has to be drilled for the pressure fitting that's provided. To ensure that it's snug, seal the threads with a thread-locking compound.



The Inferno ST takes quite a while to build because it has a million little parts. You need a lot of patience, but it's worth it. When I hit the track, I remembered what a blast 1/8-scale gas is!

SERVED ON AN ALUMINUM TRAY

All the radio gear is on one removable tray—great planning by Kyosho! These things get filthy, so it's great to be able to remove five screws and have the electrics out and in your hand. The kit also has a nifty Lexan receiver cover to keep out the spooze.

At first glance, the linkage for the carb and brakes looked a little sketchy, but I followed the instructions, and it almost *fell* together. I knew it would take a few tanks of fuel to get the front and rear brake bias dialed-in to my driving style.

I was starting to really get excited, because the kit was almost ready to run. I just had to charge the receiver battery, glue the tires to the wheels and then bolt them on. Gluing is a must because this truck's power output is far superior to that of its electric cousins; and without the use of major bondage, the tires will be ripped right off the wheels.

TRACK TIME

Off to the Fast Action Race Track I went with my new toy. Loyal readers may remember that this track is *Car Action's* secret West Coast test track. It's also the track that has broken many an R/C car. Also making its debut was my DuraTrax starter box. With its alignment pins and spring-loaded top, you only have to set your buggy or 1/8-scale truck on the track, press down on it and *VaVOOM...*

My truck fired right up and ran at a fast idle. I made a few last-second checks to ensure that all was set to go, and everything looked good. Seeing a little oil coming out of the exhaust showed me that I was running on the rich side of things. To ensure that the pipe wouldn't melt a hole though the side of the body, I protected the body with heat-shield tape.

WARP SPEED MR. SCOTT

It's always hard for me to break in a new engine, because it's torture to have that much power and to have to drive like your grandfather in his '61 Rambler. Trying to avoid seizing the engine, I eased away, and it revved up and roosted big time.

With a few small adjustments to the carb and the brake bias, it was all coming together; the engine was loosening up and putting out even more horsepower than before. The carb hadn't been opening all the way, and I was sure that the "roostability factor" would go up when it did.

After a little more tweaking, it was time to do some serious motoring with this bad boy of gas trucks. Fueling up and firing up, I hit the track with a vengeance—first on the oval

(Continued on page 120)



The Airtronics Caliber is one of the most popular high-end radio systems. It's available in several configurations, i.e., choice of receiver and servo options are given.

Airtronics Caliber

Users' Guide

by JEFF BARTLETT

ELECTRONIC EASYSPEAK

WITH THE INTRODUCTION of racing equipment that's more efficient, more durable and more adjustable than last year's models, the R/C industry consistently pushes the cutting edge of technology. For more than two years, the Airtronics* Caliber 3P has stood tall in a vast field of top-of-the-line radio equipment.

The Caliber is known for its LCD computer display, which will make any electronics enthusiast drool with delight. This Cadillac of radios is a full-blown system that's designed for hardcore enthusiasts and racers. Its many features remain a mystery to all but the indoctrinated few, so come along on this guided tour.

JACKPOT IN THE BOX

The radio comes with a 3-channel FM receiver, a servo (or servos; there are several packages from which to choose) and a battery tray that holds eight AA cells. Airtronics offers an optional, rechargeable Ni-Cd battery pack with an overnight charger—a convenience that's well worth the investment. Once you've slid the Ni-Cd battery into the radio's base, you can charge it with the Airtronics 95033 charger by simply plugging the charger's cord into the radio. No matter which battery powers the radio, the Caliber will sound an alarm when the transmitter voltage drops below 9.1 volts, warning you to charge it up or install fresh batteries.

With the batteries installed, the radio is well-balanced in your hand and very stable on the workbench. The grip is comfortable and, using the included extension handle pads, it can be adjusted for those who need a larger grip surface. Left-handed drivers can turn a few screws to rotate the handle.

The ergonomic details are best appreciated when the radio is in your hand. The ON/OFF slide switch is accessible with your thumb. Close to your steering hand are the AUX, ST TRIM, TH TRIM and TH EPA-L dials, which surround the steering wheel. Between the AUX and ST TRIM dials, there's a small, but very useful, button—labeled ST-W—for starting and stopping the built-in stopwatch. The stopwatch is a helpful tool for dialing-in your vehicle to a particular track; it allows you to time practice runs and to make appropriate gear selections.

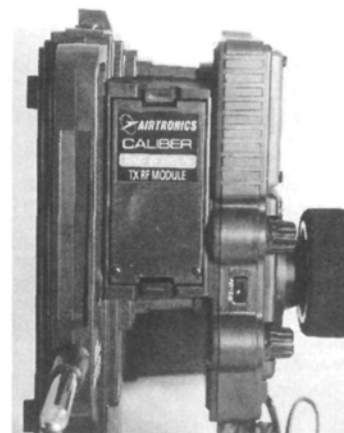
Under the screen, there are six "chiclet" buttons that you can use to select from among the microcomputer's 15 modes. Most of the modes are



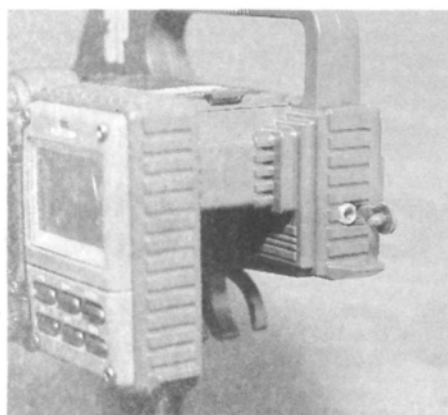
To conserve energy, there's a switch that allows the LCD display and computer to be turned on without energizing the transmitter.



For heavy-duty applications, such as off-road racing or monster trucking, it's wise to invest in the Pro high-speed servo. It's heavier than the diminutive microservo, but, with the increase in size, there's serious torque.



The crystal hides behind door number two on top of the radio. To replace it, a small Phillips screwdriver is needed.



The direct servo controller allows you to make adjustments to your vehicle without transmitting RF; simply plug the DSC harness into the radio jack. This feature is handy when you are unsure of the frequencies that are being used.

familiar to experienced drivers; only the adjustment process is different. Straightforward, accurate settings with digital numbers eliminate the need to make analog settings using a little radio screwdriver.

The few new items to be accessed through the computer are the three separate memory files that can store the settings for three vehicles. These settings can even be electronically transferred to another Caliber radio. The computer age is definitely here—and welcome!

DEPECHE MODES

The screen displays the abbreviated name of each mode, which you can access by scrolling the cursor using the left or right button. The radio comes in BATT mode, displaying the current voltage (Figure 1).

Moving to the right, D/R allows you to set

the steering dual rate—the amount of steering your car has. For racing, set the radio to allow the minimum amount of steering necessary to navigate the track. This is set in a percentage, which can be easily modified during a race by rotating the dual-rate dial on the grip using your thumb. On the dial, each click represents a 2-degree change (Figure 2).

EPA, also known as endpoint adjustment, allows you to calibrate the radio for the vehicle's cornering capabilities and to tune the high-throttle position and the brake endpoint. In sub-mode ST, you can program the steering percentage to compensate for the differences between the vehicle's left and right turning characteristics by setting limits. By turning the steering wheel, you can configure a car for oval racing, or compensate for uneven tire wear or an unbalanced chassis. By pushing ST/TH, you activate the throttle (TH) sub-mode, which allows you to make changes in the movement needed for forward throttle and braking. This easy adjustment is great for mechanical braking systems that are found on gas-powered vehicles (Figure 3).

The next mode the cursor highlights is the S-POS—the starting-position switch. This function allows you to adjust your gas engine's idle speed in 1-degree increments to improve the starting efficiency and warm-up of your car.

Next is the MDL-S (model-select mode), which allows you to assign 1, 2, or 3 to each vehicle to correspond with its radio settings in memory; 1 could be your on-road car, 2 could be your off-road car, and 3 could be your off-road truck. This convenient feature eliminates the need to re-calibrate the settings for each vehicle between heats (Figure 4).

Function Glossary

FACE DIALS

AUX

Auxiliary

ST TRIM

Steering trim

TH TRIM

Throttle trim

TH EPA-L

Throttle endpoint adjustment—low end

FACE BUTTON

ST-W

Stopwatch

SCREEN DISPLAYS

BATT

Battery level

D/R

Dual rate

EPA

Endpoint adjustment

ST

Steering endpoint adjustment (sub-mode)

TH

Throttle endpoint adjustment (sub-mode)

S-POS

Starting-position switch

MDL-S

Model select

DATA-C

Data copy

DATA-R

Data reset

TRM-M

Trim memory

ARC

Adjustable rate control

ARC-P

Adjustable rate control point

REV-NOR

Channel-reversing switch

STW-U

Stopwatch up

STW-D

Stopwatch down

KEY LOCK

Setting lock



Figure 1

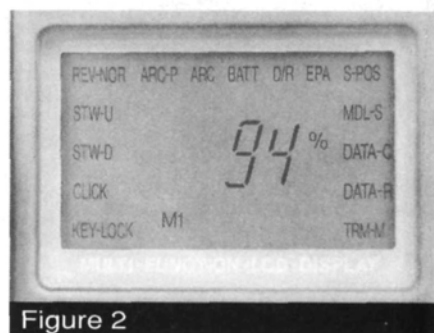


Figure 2

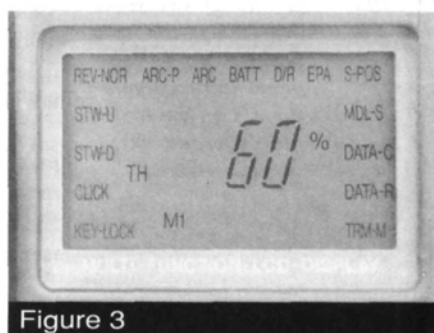


Figure 3

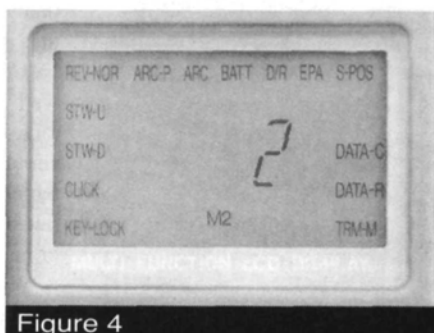


Figure 4

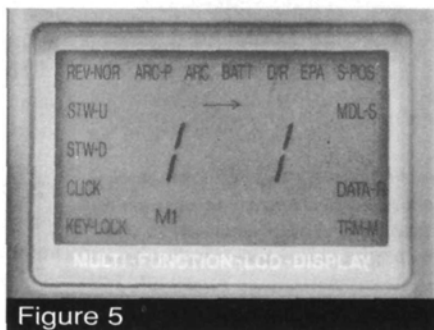


Figure 5



Figure 6

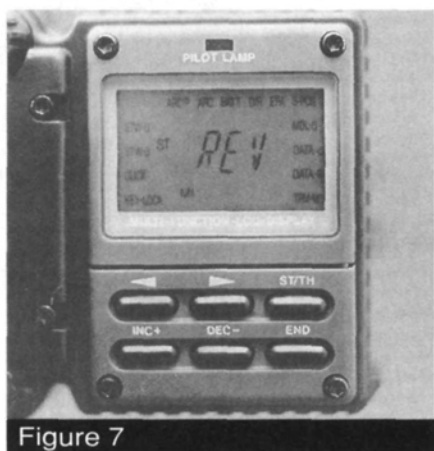


Figure 7

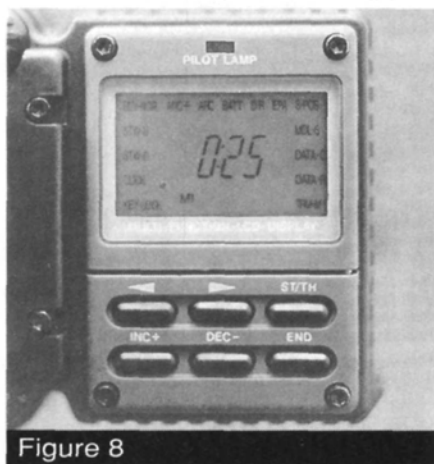


Figure 8

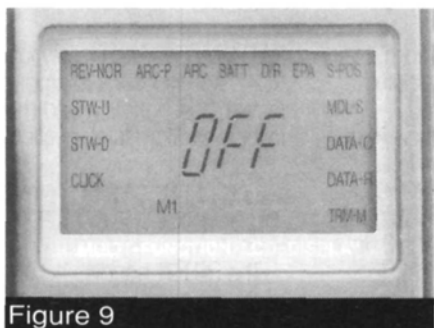


Figure 9

Copying the data from one memory position to another is as simple as entering the data-copy mode (DATA-C), selecting the file you wish to transfer (1, 2, or 3) and selecting the memory position that you want to save the data in (Figure 5).

If you replace or radically change a vehicle, DATA-R will reset the data for it and allow you to dial it in from the neutral positions.

The trim memory can be programmed in the TRM-M mode, which commits the neutral positions of the steering and throttle to memory. Once these positions have been set, the steering and throttle will return to them when the radio is turned on, regardless of their respective trim position.

By using the adjustable-rate control feature, which is accessed by highlighting ARC, you can dial-in the radio's response rate to suit your track or driving style. Both the steering and throttle responses can be adjusted in this way, giving the driver complete control over the speed of the radio's response to fingered commands.

ARC-P allows the driver to set the point at which the adjustable control curve takes effect. This fine-tuning feature is preset to neutral—50 percent. From there, it can be increased or decreased by 1 percent at a time so that you can precisely set the wheel movement and the throttle trigger movement (Figure 6).

The REV-NOR mode replaces the traditional servo-reverse switch (Figure 7).

The stopwatch timer is displayed in the STW-U and STW-D modes; the first mode counts up, and the second counts down (figure 8).

If the command signal switch is on (set through the CLICK mode), the radio will signal whenever a key error is made.

Finally, the KEY-LOCK function prevents data from being accidentally altered once the settings have been programmed. This is especially helpful when young enthusiasts, eager to push buttons and ask, "What does this do?" ask to look at your radio (Figure 9).

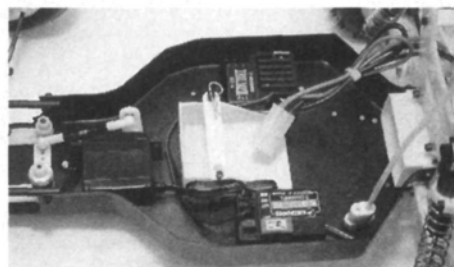
FULL OF HOT AIRTRONICS

Airtronics has a number of components that complement the core Caliber system. For heavy-duty race applications, you would do well to replace the stock servo with a Pro high-speed servo (part no. 94151). These torque monsters are great for off-road cars and trucks. Airtronics also offers a variety of electronic speed controllers.

Installing the Caliber radio system is straightforward. The steering servo can be servo-taped or screw-mounted, depending on

your kit's instructions. To protect your equipment, be sure to use a servo-saver of high quality. Choose a position for the speed controller that will allow the heat sinks to breathe, but be sure that its wires can reach the motor and the battery pack. Low-resistance connectors, short wires and secure solder connections will ensure maximum performance.

Put your vehicle on a stand (improvise if necessary), get out the owner's manual and cycle through the different modes. After



Installation of the Caliber system is just like that of any other radio. Give your ESC room to breathe, and keep the wiring clean. For this RC10T, the PRO high-speed servo was used.



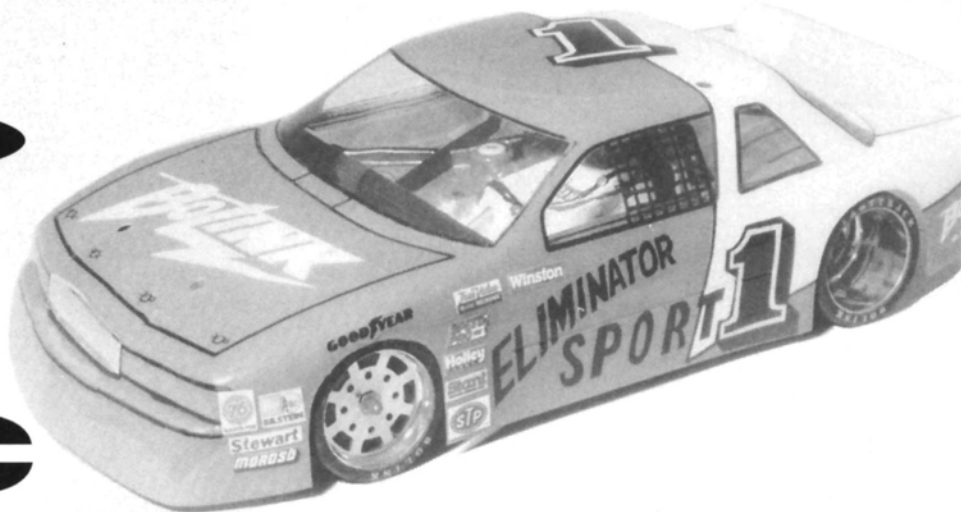
Orbiting the steering wheel are dials (AUX, ST TRIM, TH TRIM and TH EPA-L) that allow you to make last-minute adjustments without cycling through the computer menu.

you've entered the basic settings and you've practiced toying with each control, you'll be ready to take your vehicle outside and enjoy the ease of dialing-in with the Caliber.

Perhaps the radio can be best appreciated when you use it for the first time in a local race, whether it's at your club's track or in your backyard. While the competition fumbles to set their radios, you can deftly scroll through the necessary modes and make slight changes in the programmed settings. Next race...no problem. Just enter MDL-S and select the number assigned for your other vehicle, and you'll be ready to hit the dirt, while the competition hits their foreheads trying to recall their settings.

**Here's the address of the company featured in this article:*
Airtronics Inc., 11 Autry, Irvine, CA 92718; (714) 830-8769.

It's About Time



spec class Racing

THE TECHNOLOGY behind serious R/C racing has become very specialized, and the hobby's costs have increased with its sophistication. There are off-road, on-road, dirt-oval, 2WD, 4WD, carpet, independent-suspension, pan, floating-rear-pod and torsion-bar cars. There are almost as many battery types: 1200, 1300, 1400, 1500 and 1700mAh SCs, SCRs and SCEs. There are AM, FM and PCM radios and lightweight receivers to go with them. There are many kinds of servos. There's a multitude of stock motors that come in a variety of winds and timing configurations. There are sport and pro dynos and support equipment that can include personal computers and printers. There are high-frequency, low-frequency, regenerative and programmable speed controllers. There are solder stations and no-loss, three-pin, four-pin, gold-plated and silver-coated connectors. There are AC and DC motor zappers. And there are lathes available to true both modified and stock armatures—and so on and so on.

• **Question one.** Is there a need for this plethora of

technological gadgetry? The answer is yes. Racing technology for full-size autos filters down to give us safer production cars that have better handling characteristics. The same principle applies to R/C cars. Much is learned through high-end racing that gives us more durable beginner cars that have improved handling capabilities. Besides, to some, R/C racing is a sport as serious as pro football: win at all costs!

• **Question two.** Is all this gadgetry necessary for racing and for having a good time? The answer is a resounding *no!* I'm the president of the Malta Area Radio Control Racers (MARCR)—a healthy R/C club in upstate New York. A few years ago, we had a problem. We realized that the racing classes that we had defined encouraged all-out racing—and the spending that goes along with it. We also realized that, from year to year, we were losing racers, and the main thing that kept them from returning was the cost of keeping up. Something had to be done to keep racing alive.

Could we provide close, competitive racing and keep the cost down? If we could, would there be fewer dropouts? Would former racers return if they found out about it? Could we create a fair playing field for all racers? Would it have a negative effect on the regular classes and racers? Enter Spec-Class racing: not a new

After reading this article, maybe you can form a Spec Class at your track to attract newcomers to the exciting world of R/C car racing.

idea, but one whose time has arrived.

Our club's IROC Spec Class is the direct result of this magazine's March '91 editorial, which described an idea that was tested at a track in Connecticut. After reading the editorial, I knew that our club had to start a similar class.

I introduced the idea at a meeting and, after a lengthy discussion, it was accepted. Rules were hacked out within a few days, and IROC was born. The idea was to equalize the performance of the IROC class through mechanical and electrical limitations. We wanted to keep the cost of full-fledged competition within the reach of anyone who wanted to compete. Of the 60 to 75 entrants in MARCR's Saturday night club races, 10 to 15 are in our IROC Spec Class.

THE RULES

• **Chassis.** In our rules, the only kit allowed is a Bolink '91 Sport. Why? It's an almost indestructible pan car that handles decently and costs only \$52 to \$70 (depending on where you buy it). It comes as a complete rolling chassis (body, wheels and tires) but, if you want to step up to Stock Class, you can update it with the Super Sport rear suspension.

• **Speed controller.** Only mechanical and sport-type speed controllers are allowed, such as the Novak T4, the Futaba 112b and the DuraTrax T4.

• **Batteries.** The only batteries allowed are sealed, marked, club-made packs that have Sanyo 1300 SCs and Tamiya-type connectors. We don't know anyone who sells matched or pushed Sanyo 1300 batteries, and

The club's Spec Class rules allow the use of only sport-type electronic speed controllers, such as this DTX-4 from Duratrax. For those who can't afford an ESC, mechanical speed controllers are also allowed.



PHOTOS BY KERRY CAHILL

by KERRY CAHILL

this made the selection easy for us. Among these batteries, the difference in run time was no more than four percent and the difference in voltage, no more than two percent. I ran one of these packs three times a night, once a week, for six months before it started to give up the ghost—not bad for \$20.

- **Gearing.** The kit's 48-tooth, 32-pitch spur gear is the only one allowed, and only three pinions are allowed: 10-, 11- and 12-tooth, 32-pitch. This produces a gear ratio between 4:1 and 4.8:1—just right for our carpeted track.

- **Bearings.** Bearings aren't allowed. The kit comes with bushings, and the car must be run that way! No modifications may be made to the chassis.

- **Radio.** Only AM radios are allowed.

- **Motor.** Racers may use only the Trinity Slot Machine—a consistent, long-lasting motor that's ideal for this type of racing. So far, so good.

INTRODUCING THE CLASS

I bought a Bolink '91 Sport and put it together. Well, I *tried* to put it together. I received an incorrect part for the differential in the kit. For an hour, I tried to get it to fit, but it wouldn't. I figured that it was the wrong part, so I called Bolink and explained my situation. The strangest thing happened. The guy I spoke to said that he knew about the mix-up and that he would send me the correct part right away.

He was pleasant, courteous and apologetic. I figured I'd have to wait for a week or more for the part to arrive. Was I surprised (flabbergasted is more like it!) when the part was delivered to my house in fewer than 48 hours!

I finished assembling the car, and I painted the body Daytona yellow and added MARCR IROC decals. I put it on display at the club races, and I even took it out and showed it off a few times. But this was as exciting as watching grass grow. Something had to be done and, after much badgering, I managed to convince my friend Richard to buy a Bolink Sport so that we could demonstrate how the class would work.

In the summer of '91, Richard and I started to race in the IROC class—just the two of us—and the strangest thing happened. We had two cars that were equally matched in handling and speed, and we started to have fun. *Just the two of us.* Remember when R/C racing was fun—nose to tail,

side by side? Wasn't that the reason that most of us got into racing—for fun? Richard and I forgot that we were supposed to be promoting a new class, and we just had a ball racing against each other. I would win a heat; then he would win a heat; neither of us could run and hide from the other. The other racers noticed our enthusiasm, and interest in the class began to pick up.

On the first day of the '91-'92 season, we had six IROC entries. During the year, entries increased by as many



Spec-Class drivers of the Malta Area Radio Control Racers. Do these guys look as if they know how to have a good time, or what?

as 15 each night.

For about \$225, racers who started with no R/C equipment could get a complete race setup equal to that of anyone else in the class. Is the performance of these cars the same as pan-car Stock? No. But you can have 87 percent of the performance and 100 percent of the fun of a full-blown Pan-Car setup for about 20 percent of the cost.

IROC will never replace full stock racing. It isn't supposed to. But maybe it will ensure the longevity of our hobby, clubs and tracks. IROC provides an alternative.

This is our second IROC season, and although we've made a few improvements to allow the use of newer sport speed controllers, bumpers and tires, it's basically the same. Bolink Sports have started to appear in the novice ranks; some of those drivers will probably choose IROC racing to develop their skills.

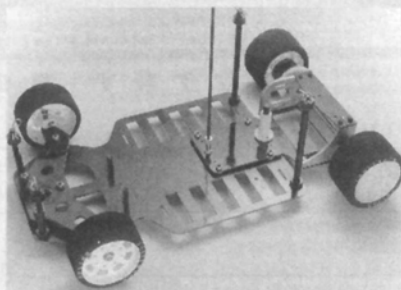
It might be time for *your* club or track to implement Spec-Class racing. Think about it.

Good Sports-Manship!

Bolink's original Sport 1/10-scale car was released in the late '80s to satisfy the needs of fledgling racers who craved competition, but had limited budgets. The idea was to make a very inexpensive car that could be upgraded as its owner's skill grew.

This concept is embodied in Bolink's '91 Sport—the most recent version of the Sport series and the best-selling car Bolink has ever released. It was designed to be inexpensive, with a fiberglass chassis and standard bronze bushings instead of bearings. Of course, the '91 Sport can be fitted with bearings, and Bolink offers a kit to upgrade the rear suspension to full racing specs (BL-5075).

To keep the excitement going, you can buy different versions of the '91 Sport chassis: a Radical pickup truck body, or a "Jammin'" GMC Jimmy body. It's a lot of fun for the low retail price of \$99.95.



1993

PROCAR Northern



Top 10 finishers in the Pro Series Class.

Dash for cash

EVERY ONCE IN a while, something

ultimate way to charge batteries. Well, whatever the case may be, there had been no profound changes on our racing scene for a long time—that is, until the PROCAR racing organization arrived!

PROCAR is the new kid on the block, and its intent is to add a touch of excitement and realism to our hobby's racing arena. For those of you who aren't in the know, PROCAR debuted its racing series this year with a superspeedway division that consists of three classes: Pro Series, Formula America and Sportsman Stock. Pro Series consists of 30 fully sponsored Team drivers who were voted into the class by their peers, and the Formula America Class allows racers with limited sponsorship. Sportsman Stock is a bone-stock class in which you're allowed no sponsors, and you run the standard handout stock motor—in this case, a 21-turn, 12-degree PROCAR motor manufactured by Trinity. That helps keep things fair for everyone. PROCAR plans to include off-road racing in next year's lineup.





The top eight racers in the Formula America Class.

Nationals

by JOHN HOWELL



Joel Johnson lost the Pro Series A-Main, and the big money, by just a few feet.



Steve Fiume took the win in the Formula America Class and a check for \$750.

Pro Series winner Chris Smith receives a check for \$1,200 from John Thawley. Hey, John! Let go!



So what distinguishes PROCAR from the other sanctioning bodies, you ask? Well, the bottom line is that PROCAR kicks down cash when you win—a lot of cash, as a matter of fact! Win the A-Main in the Pro Series or the Formula America Class, and you get big bucks. A first place in the Pro Series nets you \$1,200, and second place earns a not-too-shabby \$500. Grab the checkered flag in the Formula America Class, and you walk home with \$750; the runner-up takes \$300. All other finishers in both classes receive cash prizes as well. No one is left out! All A-Main winners of the Sportsman Stock Class receive gift certificates from \$50 to \$500.

THE SEASON OPENER

The first PROCAR national race—the '93 PROCAR Northern Nationals—was held at the K/N Speedway in Connecticut



These two young racers, Erin Rand (left) and Frank Polimeda (right) each received \$50 checks for displaying good sportsmanship during their Mains. Incentives like this might encourage cleaner races.

from June 11 to 13. I decided to cruise out to Stafford Springs to check out the first “dash for cash.” Top pros from all over the country would be there, and I received the early word from PROCAR president John Thawley that attendance would be fairly high.

Trinity's racing team was out in full force; the Evolution 10ss was driven by six of the 10 drivers in the Pro Series A-Main, and many were raced in the Formula America and Sportsman Stock Classes. The Trinity team members attending this race were Joel Johnson, Jim Dieter, Mike Blackstock and Shane Kocher. Bud Bartos, Kent Clausen, Chris Smith and Tyree Phillips were also among the top drivers who made the trek to



The three TQ amigos: Pro Series TQ, Joel Johnson with his TQ Trinity Evolution 10ss (left); Sportsman Stock TQ, Joe Allevo and the TQ Trinity Evolution 10ss (middle); and Formula America TQ, Steve Fiume and his TQ Associated 10L SS (right).

the race. One of the weekend's biggest surprises was seeing former Associated driver Kent Clausen driving a new Trinity car!

I caught practice and the first round of qualifying early on Saturday. At the end of the day, I headed back to my hotel room to get ready for the final rounds of qualifying and the next day's race.

LET'S GET READY TO RUMBLE

The events started early (around 8 a.m.), and the racers were already out in full force by the time I got to the track. Joel Johnson and Chris Smith were tearing up the track in the Pro Series Class, and Dieter and Kocher turned in some fairly decent runs, too. In the end, Joel was the man with the pole position.

The qualifying order in the Pro Series is unique. The top two racers in the B-Main actually graduate and are bumped up to the open ninth and 10th positions in the A-Main.

Those two lucky guys happened to be Tyree Phillips and Jim Fuller. In the Formula America Class, Steve Fiume dominated qualifying, and in the Sportsman Stock Class, Joe Allevo showed he was gunning for the A-Main win. So with the qualifiers all set, it was time to start racing.

SPORTSMAN STOCK A-MAIN

Heading up the eight-man Sportsman Stock Class pack was TQ Joe Allevo, who drove a Trinity Evolution 10ss. Joe got a jump on the pack as the buzzer sounded but, unfortunately, he got tangled up in traffic in lap two, and he couldn't continue. With the number-one car out of commission, Jim Rufiange, who drove a Hyperdrive H10RS, secured the lead and was quickly followed by Chris Harrington and John Larson. Past the 1-minute mark, the order was Jim Rufiange in first, followed by

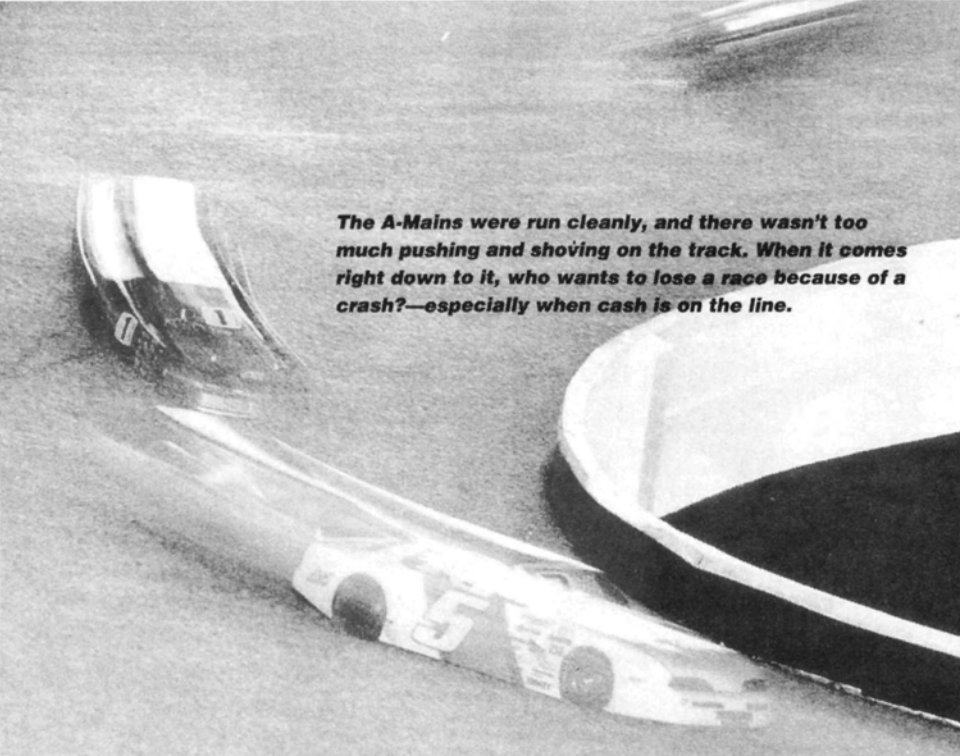


MIKE'S PUNISHMENT!

He's being sent to the corner!

One of the cool things about going to big races is meeting people. At every race I attend, I meet someone new. Yeah, I come across some spodes along the way, but the majority of the people I meet are pretty hip. At the PROCAR race, I met Trinity driver Mike Blackstock.

Mike's a pretty cool guy, but I have a feeling he was jinxed at this event. Every time he sat down to watch a practice or a race, at least one car would crash right into the wall in front of him. It was really freaky! The minute he would sit down along the track...bam!—major collision. I can't tell you how many times it happened; I lost count. It quickly became the running joke at the track: “Don't stand next to Blackstock; you might get decapitated.” Unfortunately, Mike's bad luck followed him into the A-Main, and his car broke on the 36th lap. Better luck next time, Mike. And next time, bring your rabbit's foot!



The A-Mains were run cleanly, and there wasn't too much pushing and shoving on the track. When it comes right down to it, who wants to lose a race because of a crash?—especially when cash is on the line.

Chris Harrington, John Larson, Randy Bonomi, Aaron Brown, Brian Ziegler and Chris Prosser.

At around the 2-minute mark, Larson began putting pressure on second-place runner Harrington. Suddenly, with roughly 30 seconds to go, Harrington crashed coming out of turn three, but miraculously kept it going—not without losing crucial time and positions, though. As the tone sounded to end the race, Rufiange crossed the line first, followed by

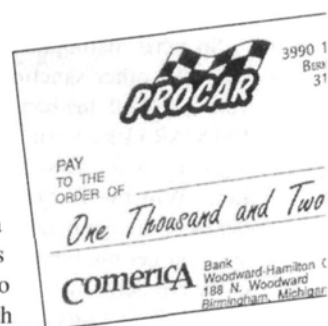
Larson, Bonomi, Brown, Ziegler, Harrington and Prosser.

FORMULA AMERICA

Leading the eight-man Formula America pack was Steve Fiume of East Hartford, CT. Driving an Associated 10L SS, Steve grabbed the holeshot as soon as the tone started the race, and he never looked back. He was quickly pursued by third qualifier Frank Polimeda, and everyone got through the

first turn without any bumping or bashing.

It looked as if we were in store for a really clean race! Following Polimeda in third place was Steve Maslin who was applying as much pressure as possible.



Vantage Engineering's Steve Gilbert attended the festivities and decked out his car in the traditional PROCAR garb. Steve had a few of Vantage's trick items on display, such as their charger, their dyno and their all-new battery discharger.

Maslin eventually passed Polimeda toward the end of the race, but then he fell back to fifth. By that time, it seemed almost impossible to catch leader Steve Fiume. Fiume took the checkered flag and was followed to the line by Polimeda, Warren Strong Jr., Bill Stratton, Steve Maslin, Ken Tuttle Jr. and Ryan Korek. Todd Putnam, unfortunately, didn't finish the race.

After everyone had taken their cars to tech, Steve Fiume's car met all the legal requirements, and he walked away with the check for \$750. Second-place Polimeda secured the \$300.

PRO SERIES

Leading the men into battle in the Pro Series Class was none other than Trinity's "Bad Boy," Joel Johnson. Joel TQ'd driving the new Trinity EV10ss. After a bumpy start, Trinity's Jim Dieter jumped into

PRO SERIES

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	2	Chris Smith	Composite Craft	East Coast	New Wave	Novak	KO Propo	Bolink	TRC
2	1	Joel Johnson	Trinity EV10ss	Trinity	Trinity	Novak	Airtronics	Bolink	TRC
3	4	Shane Kocher	Trinity EV10ss	Trinity	Trinity	Novak	Futaba	Bolink	TRC
4	6	Bud Bartos	Trinity EV10ss	BRP	Power Push	Novak	KO Propo	Bolink	Jaco
5	5	Jim Dieter	Trinity EV10ss	Trinity	Trinity	Novak	Airtronics	Bolink	TRC
6	7	Dave Hechler	Associated 10LSS	East Coast	Power Push	Novak	JR Propo	Bolink	TRC
7	10	Tyree Phillips	Trinity EV10ss	Trinity	Trinity	Novak	KO Propo	Andy's	TRC
8	9	Jim Fuller	Trinity EV10ss	Trinity	Trinity	Novak	KO Propo	Bolink	TRC
9	3	Mike Blackstock	Trinity EV10ss	Trinity	Trinity	Tekin	Futaba	Bolink	TRC
10	8	Mike Boylan	Associated 10LSS	Twister	Team Smooth	Novak	Futaba	Protoform	TRC

FORMULA AMERICA

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Steve Fiume	Associated 10L SS	Mighty	New Wave	Tekin	Futaba	Bolink	TRC
2	3	Frank Polimeda	Trinity EV10ss	Trinity	Trinity	Tekin	Airtronics	Protoform	Jaco
3	5	Warren Strong Jr.	Trinity EV10ss	Trinity	Trinity	Tekin	Futaba	Bolink	Jaco
4	8	Bill Stratton	Associated 10L SS	Mighty	Ballistic	Tekin	Futaba	Bolink	Jaco
5	7	Kenneth Tuttle Jr.	Trinity EV10ss	Trinity	Trinity	Tekin	Futaba	Bolink	Jaco
6	4	Ryan Korek	Trinity EV10ss	Trinity	Trinity	Novak	KO Propo	Protoform	Jaco
7	6	Todd Putnam	Trinity EV10ss	Trinity	Point Blank	Tekin	KO Propo	Bolink	Jaco
8	2	Steve Maslin	Composite Craft	Mighty	VooDoo	Novak	Airtronics	TRC	Jaco

SPORTSMAN STOCK

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	3	Jim Rufiange	Hyperdrive	PROCAR	MC2	Tekin	Futaba	Protoform	Jaco
2	5	John Larson	Hyperdrive	PROCAR	MC2	Tekin	Futaba	Protoform	TRC/Jaco
3	6	Randy Bonomi	DA Graphite	PROCAR	CAM	Novak	JR Propo	TRC	Jaco
4	4	Aaron Brown	Composite Craft	PROCAR	PTI	Tekin	Futaba	Bolink	Jaco
5	8	Brian Ziegler	Hyperdrive	PROCAR	B&T	Novak	Futaba	Protoform	Jaco
6	2	Chris Harrington	Trinity EV10ss	PROCAR	Trinity	Tekin	Futaba	Protoform	Jaco
7	7	Christopher Prosser	Trinity EV10ss	PROCAR	B&T	Tekin	Airtronics	Protoform	Jaco
8	1	Joe Allevo	Trinity EV10ss	PROCAR	Trinity	Novak	Futaba	Pro-Line	Jaco

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June 13, 1993

\$ 1,200.00

XX/00 DOLLARS

hundred

This is the first thing that caught my eye when I entered the K/N Speedway. Now, let's see; the race is 4 minutes long, and that's 240 seconds. So, for winning the Pro Series Class, you'd make \$5 a second! Not too shabby, huh?

the lead and was pursued by Chris Smith, who drove a Composite Craft X-chassis 10L. Following Smith were Mike Blackstock and Joel. Suddenly, Dieter got into some trouble, and Smith drove past him to take the lead; Blackstock also sneaked past for second

TIME TRAVEL AT K/N SPEEDWAY

A blast from the past!

I was kickin' back in the pits with Joel Johnson and Mike Blackstock when a fellow approached us with a bunch of old R/C newsletters (circa 1978 to '82). We spent the nexthalf hour checking out and laugh-

shots of Kent Clausen and Mike Lavcot. They looked like little kids! Well, maybe that's because they *were* little kids. Anyway, we signaled Kent to come and check it out so we could make fun of him, and when he got close enough to see, he did a major U-turn and laughed, yelling, "Forget it, guys." You'd think he knew.

Joel opened up to the middle of one issue, looked at a photo, then tried to hide the paper from the gathering crowd. Upon closer

inspection (when we ripped it out of his hands), we saw a picture of a fat, pudgy-faced kid, and guess who it was—Joel, of course. "Oh man!" exclaimed Joel. "I can't believe that's me." Oh, well, sometimes it's just best to look back and laugh. I wonder who will be holding on to a few old issues of *Car Action* years from now, laughing at old pictures of themselves. Maybe it will be us!

Circuits and R/C Racing News. We saw some pretty wild scenes of the olden days.

There were photos of Gary Kyes (now with Team Losi) in his heyday and some shots of Gene Hustings and Roger Curtis of Associated fame. Eustace Moore of MIP was in a few of the issues—with hair! Most of the machinery was so outdated it was comical. Leafing through other issues, we found some really old

place. That left Smith out front, followed by Blackstock, Dieter and Johnson.

At around the 2-minute mark, Blackstock and Dieter were busy battling, and they let a hard-charging Johnson sneak past them. Joel then began to reel in leader Smith. Shane Kocher put on a great show as he charged from the back of the pack and passed Blackstock to third place overall. Joel was all over Smith's bumper when there was an accident in front of them coming out of turn four, and it flipped Johnson onto his lid. Turn marshals reached his car quickly, but Smith had extended his lead by a considerable margin—at least three-quarters of a lap.

Smith and Johnson had a full lap over the rest of the field at that point, but now it was just a matter of whether Johnson could catch Smith. With \$1,200 on the line, neither was taking the racing lightly. With a full string of traffic between them, it looked

as if Johnson wouldn't be able to catch up. Joel charged, but Smith took the win. Johnson was followed by Kocher, Bud Bartos, Dieter, Dave Hechler, Tyree

Switcharoo!

One of the event's biggest surprises was seeing Kent Clausen drive a Trinity Evolution 10ss car instead of an Associated ride. What's up with that?

only the racing that made it interesting for me. Watching John Thawley give out more than \$4,000 worth of cash and prizes to the racers was pretty intense. When I saw the two big checks for \$1,200 and \$750 hanging on the wall, I got really stoked. The big bucks definitely made the competition much more intense, and at the same time, the racing was also cleaner. No one wanted to risk losing his race owing to a crash or rubbing fenders.

I have to say the first PROCAR Nationals were a huge success. While I walked through the pits, I noticed that nearly everyone



K/N Speedway in Connecticut hosted the '93 PROCAR Northern Nationals. More than \$4,000 in cash and prizes was given out during the weekend.

Phillips, Jim Fuller and Mike Blackstock.

ENDORSE THOSE CHECKS!

When I went to the race, I really didn't know what to expect. I was psyched to watch all the top drivers—such as Joel Johnson, Mike Blackstock, Bud Bartos, Jim Dieter and Chris Smith—race against one another. But what impressed me the most was the money! I'm not gonna throw any b.s. at you about how it was

was having a good time. There were no fights, no rumors of cheating and no negative displays by any of the racers. I think John Thawley has a winning combination going here—professionalism, cash and R/C racing. It works for full-size racers; why shouldn't it work for us? ■

The Procar Northern Nationals were sponsored by R/C Car Action, CAM Racing Motors, Team Class, Composite Craft, Novak Electronics, Panasonic, Point Blank, PSE, Robinson Racing, Sanyo, TRC and Trinity.



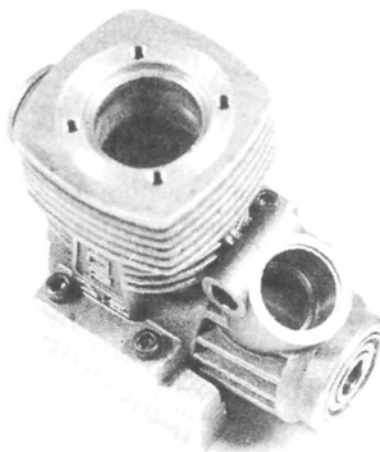
NITRO NEWS

PREP SCHOOL

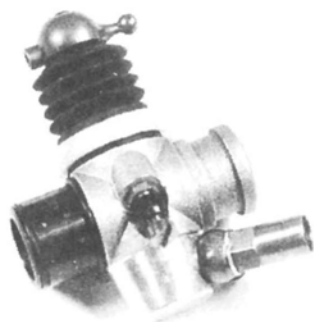
by JEFF BRONSTEIN

ENGINES SLOWLY wear under regular racing conditions and, eventually, they fall apart. It happens! Poor performance and engine problems almost always arise because of inadequate maintenance, or neglect. If you suspect that there might be a problem with an engine, there probably is. Rarely does an engine self-destruct without some prior warning. If problems are caught early, serious engine damage can be avoided.

Replacing a worn rod or a torn gasket is obviously much easier and far less expensive than replacing the entire engine. Serious racers know that prep work will keep their engines in top running condition. They take several precautionary



Air leaks usually occur between the engine case and the carburetor. Low pressure can draw a considerable amount of air through a very small hole in the engine. Tuning an engine that has an air leak is almost impossible.



To keep air and dirt out of the engine, put a small tie-wrap around the base of the "boot." (Cut off the excess tie-wrap.)

measures during setup and installation and, occasionally, perform a quick pre-race inspection.

Before installation, new engines should be inspected inside and out for any manufacturing residue or flash. Small metal fragments might be lodged inside the engine, and that can cause considerable damage at 30,000rpm. Also, I prefer to remove the cylinder head when I install the

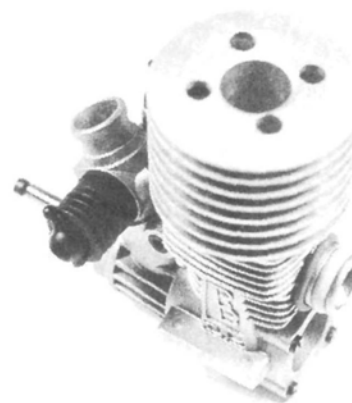
glow plug for the first time. Tapping the glow-plug hole will leave some residue that could be pushed into the cylinder. The head and backplate screws, the carburetor jam and all the fittings should be checked before the engine is installed.

AIR APPARENT

Air leaks are one of the most difficult problems to detect but the easiest to prevent. Engine tuning is difficult enough for beginners, but tuning an engine that has air leaks is nearly impossible. Small gaps between the engine parts allow air into the case, and that causes a variety of problems. If an air leak occurs during a race, it could cause the mixture to lean-out suddenly and overheat the engine. A suspected air leak can be confirmed with this simple test: with the engine running at idle, carefully place your finger over the entire mouth of the carburetor to cut off the regular flow. The engine should quit immediately. If it continues to run, even for a short time, it's fairly cer-

tain the engine has an air leak.

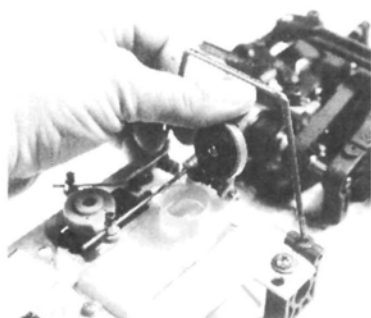
Minor leaks are most frequently found at the seal between the carburetor and the engine case. Even if the seal is joined by a gasket of some type, e.g., an O-ring, there may still be minute gaps. The low pressure



The exhaust outlet is also a typical area for pressure leaks. The exhaust manifold should ride squarely and snugly against the engine. For a tight seal on bolt-on manifolds, use a high-temperature sealer and/or a gasket.

inside the engine case can draw a significant amount of air through a very small hole. Minor leaks can cause poor idling, rough tuning and overheating. A thin layer of silicone or sealant around the outside of the joint ensures an airtight fit.

Leaks can also occur on the carburetor itself. The slide mechanism on many carburetors is protected by a flexible black rubber boot that can loosen or break. Inspect the boot occasionally, and to prevent having



After inspecting the fuel cell, put tie-wraps around the ends of the fuel tubing so that it doesn't come off during a race. This is particularly important on the exhaust side where pressure and fuel can make the fuel line slippery.

leaks between the boot and the carburetor, put a small tie-wrap around the base of the boot. At the pedestal of the needle valve is an aluminum or brass gasket, which can become worn or gouged. Again, a small amount of sealant around the base will prevent leaks. It's also wise to occasionally check the needle-valve O-ring for any breaks or wear. Small pieces of a deteriorating O-ring can lodge at the base of the needle valve and cut the flow of fuel. Most of these leaks can be avoided if you seal the engine thoroughly before you install it.

The seals around the fuel and the exhaust systems are also important. Before installing the fuel tank, always test it for leaks around the lid and at the fuel nipples. Install two short pieces of fuel tubing, and with one pinched off, blow into the other to pressurize the tank. Submerge the tank in water to discover even the smallest pinholes. After the tank has been checked and installed, use small

tie-wraps to prevent the fuel tubing from becoming disconnected.

UNDER PRESSURE

Pressure leaks in the exhaust system can impair back pressure to the fuel tank and cause intermittent mixture problems. Small quantities of spent fuel around the base of the exhaust port and back cover, or between the manifold and the tuned-pipe sections may indicate an exhaust leak. Ensure that the engine exhaust and manifold are properly aligned so that the gasket and coupler aren't being pinched. If the rubber exhaust gasket or coupler is in any way torn or broken, it should be replaced. Bolt-on exhaust manifolds can be secured using a high-temperature sealant between it and the cylinder to ensure a leak-free link.

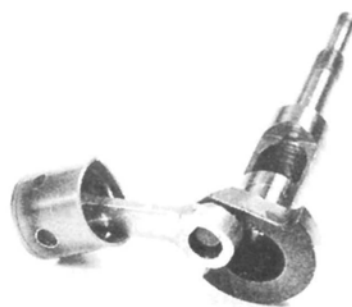
Heed the warning signs of an engine that's ready to commit suicide. Inconsistent tuning, pinging and overheating are just a few indications that the engine is crying for help.

Look for small brass or aluminum metal filings in the exhaust residue; they may indicate worn or damaged rod bushings. These filings may also show up on the glow-plug filament. Anything suspicious should be checked out immediately by carefully removing the engine backplate.

Always check the lower rod bushing for excessive play on the crankpin (this is a tough one; very little play can still be too much), and inspect the inside of the backplate cover for excessive wear or gouging. Carefully turn the crank to check for



Feel for small metal fragments in the engine bearings by turning the crank slowly. If you detect residue, flush the case thoroughly with solvent.



By the time you see a problem, it's already too late. This connecting rod is way past saving, and the piston, the sleeve and, possibly, even the crankpin are probably ruined. A close inspection of the rod bushing before the race could have revealed the problem.

debris in the bearings or bushings. A bad rod will go quickly. By the time you can see the problem, it may be too late.

I know it hurts to say goodbye to a good friend, but in every engine's life there comes a time to punt. Too often, I see decent racing equipment with worn-out, second-hand engines. I would rather have an old, beat-up chassis with a decent engine. No matter how poorly it handles, at least it's on the track and not on the table.

Compression is usually a good indication of how much life is left in an engine. As an engine runs, the tight fit between the piston and liner slowly deteriorates. This eventually allows the compressed fuel/air charge to leak around the piston and out of the combustion chamber.

To check engine compression, rotate the flywheel until you reach the point at which it's most difficult to turn. Hold the flywheel when the piston reaches top dead center, and feel the resistance. A new engine will hold the compression, while an older engine will allow the air to escape in only a few seconds. When the piston/liner fit becomes too loose, the engine won't run properly. Replacing the piston and the sleeve will renew the compression, but eventually the crank, the bearings and even the case will wear out.

Keep all the salvageable parts of the engine for spares, or use them for experimental modifications. When

(Continued on page 94)



R/C DOCTOR

by DOUG MERTES

Doc's Secret Sauce It's hot! It's spicy!

AS I SEE IT, the world is divided into two types of racers: those who are satisfied with the performance of their stock motors, and those who are always looking for an edge on the competition. As a devoted member of the second group, I've discovered a way to get more power and rpm out of stock motors, and I'm going to share it with you!

We all know that motor brushes and bushings have to be properly broken in if the motor is to reach its maximum power potential. You also know that installing bearings in your R/C car results in less drag, higher speeds and longer run times. My "Secret Sauce" method is to polish a stock motor's bushings so that they'll run as smoothly and as free of drag as bearings. Follow me, and your stock motors will run like modifieds!

THE RECIPE

Start by mixing three parts Happich Simichrome* paste (I bought mine at a motorcycle dealership, but many auto-parts stores also carry it) with one part Trinity*/Revtech Comm Drops. (I've used other combinations—brass, bronze, or aluminum polish and Comm Drops or honing fluid—but this recipe seems to work best.) Mix the paste and the drops, and store the Secret Sauce (SS) in a small applicator bottle (like those available from Competition Products*) so that it can be applied one drop at a time.

A crucial ingredient is Trinity/Revtech Comm Drops. Mix the Simichrome and Comm Drops in a 3:1 ratio, and your sauce is ready for servin'.

The bushings must be dry before you polish them. Using a high-quality motor spray, thoroughly flush out the bushings on both ends of the motor. When the motor has dried, put a drop or two of SS on each bushing. Take off the springs, and pull the brushes out of the brush hoods. Rotate the armature, pushing it back and forth to work the SS into the bushings. Now put the motor in a dual-motor jig like those from Bud's* or Class Recreational Products*, and connect it to a slave motor with surgical tubing or another suitable joining device.

Using a 4-cell pack and the slave motor (run it with the polarity reversed), spin the new motor for about 10 minutes. When you inspect the bushings later, you'll see that the SS is black and "scuzzy"-looking—a sure sign that oxidized bronze has been removed from inside the bushings, where the arma-

ture shaft runs through it!

Again using the motor spray, thoroughly clean the bushings. Spin the armature and work it back and forth a few times as you clean, because you want to clean all the SS out of the

Put your Secret Sauce in a small applicator bottle like this one from Competition Products, and you'll be able to apply one drop at a time to your motor without getting it too messy.



Happich Simichrome paste is a key ingredient of Doc's Secret Sauce. You can usually find it in motorcycle dealerships or auto-parts stores.

PHOTOS BY WALTER SIDAS

bushings. When the spray has dried, put a drop or two of your favorite motor oil onto each bushing (I like a mixture of Mobil 1 and air-tool oil), and reinsert the brushes and springs. Now that you've polished the bushings, it's time to break in the brushes. (For more information on breaking-in brushes, see Frank Calandra's article in the November 1992 issue.)

IS IT COOKED YET?

Does all this work? To find out, I bought six new Trinity Monster Stock Junior motors and then tested them right out of the box on an RSR computer-controlled dynamometer. This gave me a base-line reading for comparison purposes. The motors were very similar, with power readings of between 49.5 and 50.2 and peak rpm between 15,200 and 15,450.

With three of the motors, I only oiled their bushings and broke them in on a dual-motor jig for 10 minutes. Then I broke in their brushes at a low voltage.

Voilà! The finished product. This should give you enough Secret Sauce to treat plenty of motors.



Put a drop of Secret Sauce on both motor bushings. When you've broken-in the motor, you'll notice that the Sauce has turned black. This shows that oxidized bronze has been removed from the bushings, leaving them as smooth as Telly Savalas's head. Who loves ya, baby?

The other three motors were given the SS treatment, and their brushes were then broken in in the same way as those in the first three. The only difference in break-in method was the application of the Doc's Secret Sauce. Was there a difference on the dyno? You bet there was!

The three conventional motors had dyno power readings of 49.8, 50.6 and 51.2, with rpm peaking at 15,400 to 16,200. The "sauced" motors had power readings of 53.6, 54.7 and 56.5 and peak rpm of 17,100 to 18,200! That's a major difference—the kind that translates into an extra lap or two on the oval after a 4-minute race.

Need more proof? At the March '93 Hobby Hangar Winter Championship Oval Race in Virginia, I "sauced" four handout motors for some fellow racers (I was running modified that day—badly, I might add!). At first, they were skeptical, but after the first heat, everyone was in my pit, trying to find

out what I had done to make those guys so fast! Three drivers won their A-Mains, and the fourth won the A-Main and raised the track record by a full lap into the bargain! Nuff said?

**Here are the addresses of the companies mentioned in this article:*

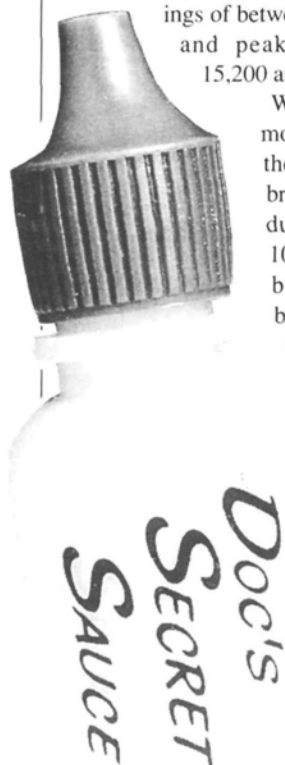
Happich Simichrome; distributed by Competition Chemicals, Iowa Falls, IA 50126.

Trinity Products Inc., 1901 E. Linden Ave., Linden, NJ 07036.

Competition Products, 8457 Sand Cherry Ln., Laurel, MD 20723.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.

Class Recreational Products, RD#1, Box 187A, Utica, NY 13502. ■



RACER NEWS

WORLD • CLASS • RACING

A Mightier Motor?

In our August '93 issue, we took a sneak peek at Trinity's new Slot Machine 2 stock motor. At the time, the only available samples of this powerplant were preproduction prototypes, so we couldn't accurately report on its performance.

But when the Slot Machine 2 hit the hobby-shop shelves, we threw it on the dyno to see how it would stack up against the current king of the hot stockers, the Speedworks Green Machine.

We tested both motors in a strictly "out-of-the-box" configuration, (we didn't change the brushes or springs), and we didn't give them any break-in (in addition to that done by the manufacturer).

We tested the motors on the Competition Electronics TURBOdyno, using the settings in its power-down memory that are recommended for testing stock motors—a constant 5 volts and six constant torque levels (the sixth torque level demanded more amps than my supply could provide, so only five are given here).

The information in the chart shows that the SM2 turns more rpm and puts out much more power at each torque load than the Green Machine. The SM2's efficiency is also higher at lower loads, but if you look carefully, you'll see that it's also drawing more amps, though this isn't a concern in stock class racing.

GREEN MACHINE					
SLOT MACHINE 2					
Step	rpm	Torque	Watts	Efficiency	Amps
1	12,659	1.4	13	39	6.7
	17,152	1.4	18	42	8.4
2	11,945	2.9	26	56	9.2
	15,633	2.9	34	60	11.3
3	11,053	5.0	41	66	12.5
	13,542	5.0	50	64	15.4
4	10,200	7.0	53	67	15.8
	11,515	7.0	60	61	19.6
5	9,408	9.0	62	64	19.2
	9,802	9.0	65	54	24.0

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Out of the box, the Slot Machine 2 is our choice for longer tracks where you need higher speeds. For tighter, twisty tracks, install heavier brush springs to decrease its rpm, raise its torque and, possibly, raise its output of watts even more.

We thought that the Green Machine would be an impossible act to follow, but it's looking as if the money Uncle Ernie has spent on designing and tooling the new Slot Machine 2 was well-spent!



ROAR Off- Road Nats

PROCAR Sweeps the Midwest

Round 2:
Ameri-Trac—Mattoon, IL

R E S U L T S

Pro Series A-Main

Pos.	Driver
1	Joel Johnson
2	Mike Boylan
3	Dave Hechler
4	Mike Blackstock
5	Craig Carey
6	Craig Perry
7	Chris Doseck
8	Jim Dieter
9	Bud Bartos
10	Tim Lanier

Formula America A-Main

Pos.	Driver
1	Brian Booze
2	Rob Cutman
3	Jason Houser
4	Frank Polimeda
5	Kirby Hand
6	Craig Evraets
7	Michael Steineke
8	Brad Hayes
9	Kevin Trent
10	Demetrius Pitchford

Sportsman Challenge A-Main

Pos.	Driver
1	Jamie Tennies
2	Greg Kraios
3	Ricky Shilts
4	Steve Lafara
5	Ryan Annis
6	Brian Pannell
7	Dan Pierson
8	Randy Marks
9	Scott Murphy
10	Richard Bostic

The most recent stop on the highly successful PROCAR tour was in the Midwest at Ameri-Trac in Mattoon, IL. It looked as if Trinity's Joel Johnson would TQ the second PROCAR National event as he laid down the law early on in qualifying, but it was none other than Bud Bartos who slammed it in everyone's faces as he showed everyone that he knew the fastest way around the track. The race itself turned out to be one of the most exciting races in superspeedway history. Bartos rocketed off the line with



Johnson and the rest of the pack in pursuit. Around the third lap, Bartos got a little squirrely and lost control of his car. Johnson jumped into the lead

and held it comfortably until the 3½ minute mark. It was then that Mike Boylan began applying pressure, and coming into the final turn, they were running almost neck and neck! Boylan tried making a wide "boomerang" pass on Johnson through the last turn, and someone ended up on his lid, crossing the line in second place a half second after first place. So which one

of them won? Guess you'll have to wait for our upcoming race coverage. Stay tuned!

This year's ROAR Off-Road Nats were held at the R/C Off-Road Raceway in Fountain Valley, CA. The race went much more smoothly than last year's fiasco at Norm's in Dallas, TX. Remember that nightmare with more than 500 entries in that sweltering warehouse? Well, this ROAR Nats had fewer entries, and the racing was

intense. Leading the pack in both the 2WD and 4WD Modified Class was Team Associated's Brian Kinwald, while Team Losi's secret weapon, Jeremy Kortz, took command of the Stock Class. In the A-Mains, both Brian and Jeremy backed up their TQ claims that they were the fastest drivers in their division as they went on to win their respective

classes. Look for an in-depth feature on the Off-Road Nats in our next issue as contributing author Wally "Winkle-spackler" Cahill gives us all the dirt. Keep it on this frequency, fellow racers.



FRESH BLOOD ON THE TRACKS

Is Jeremy Kortz just a flash in the pan?



When, like Losi's Jack Johnson, Associated's Cliff Lett and Trinity's Joel Johnson, you've reached team driver status, you're one of the elite. It's hard to get to the top; it takes practice and dedication. But new talents are always emerging: enter Jeremy Kortz.

Jeremy is the newest member of the Team Losi family. He has been kickin' butt at some of the biggest off-road races this year, and he has proved he's a force to contend with. Jeremy's latest wins include conquering the NORRCA 2WD Expert Stock Class and winning the Factory Modified Truck Class. He TQ'ed not only the Factory Modified Truck Class but also the 2WD Modified Factory Class. After his big showing at the NORRCA Nats, he went on to win the title in the 2WD Stock Class at the recent '93 ROAR Off-Road Nats. We caught up with this up-and-comer in an

attempt to find out a little more about him.

RCCA: Let's start with a few of the basics. How old are you, and when did you become involved with R/C cars?

JK: I'm 16. I'm going into my junior year of high school, and I got my first R/C truck—a Marui Big Bear—when I was 11.

RCCA: When did your racing career start?

JK: Well, about six months after I got the Big Bear, I bought an RC10. Then, after roughly two months racing it, I got my first sponsor, JG Mfg. I started winning some of the big local races like the Peak Performance Grand Prix, and then I had my big break. In '91, I sent my résumé to Team Associated, and they offered me a "parts ride." I raced for them for about two years, and I recently switched over to Team Losi.

RCCA: Why the switch?

JK: I don't want to put Associated's team down, but I noticed that there's more teamwork between the guys at Team Losi than there is with the Associated team. Everyone clicks together at Team Losi. With the Associated Team, only certain people hang together—sort of like high school cliques. I didn't like that too much. I'm having a lot more fun now, and that's the way it should be!

RCCA: Who do you try to emulate, or who's your favorite racer?

JK: Gil Losi Jr.

RCCA: Why did you start R/C racing?

JK: I'm into the sport because it's enjoyable. It's a great hobby. You travel and meet a lot of cool people. Some of the people I grew up with are into drugs and partying, and I'm not into all that

s#@! I stay clean and just have fun with what I'm doing.

RCCA: So what are your goals?

JK: I'd like to win the Worlds in '95.

RCCA: How about short-term goals?

JK: I'm off to the ROAR Truck Nats in a few weeks, and I'd like to do well there, but for now, I'll take some time off and live as a kid. You know?—go to the beach and have fun; go to parties, etc.

RCCA: Good luck in your races.

JK: Thanks. But maybe you should say that to my competitors!

Speed Shop

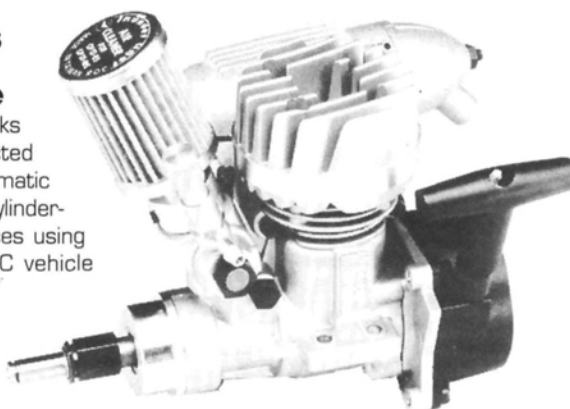
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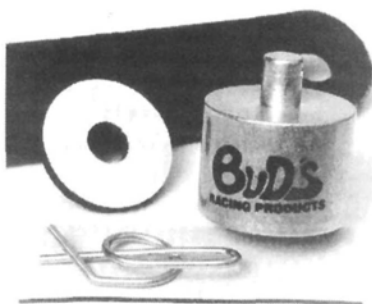
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RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (714) 393-0366.



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Part no.—DYN2100; **price**—\$17.95

Horizon Hobby Distributors, 4105 Fieldstone, Champaign, IL 61821; (217) 355-0022.



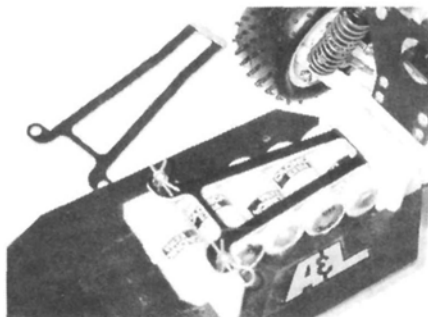
A&L

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Part nos./prices—2201/\$9.95 (for Losi LX-T, 6- and 7-cell flat packs); 2203/\$7.85 (for Traxxas Blue Eagle LS, 6-cell packs); 2204/\$7.85 (for Traxxas Blue Eagle LS, 7-cell flat packs); 2205/\$7.85 (for Associated RC10T, 6-cell packs); 2206/\$8.25 (for Associated RC10T, 7-cell flat packs).

A&L Mfg., P.O. Box 2115, Corona, CA 91718; (714) 735-5249.



TOOL RESOURCE

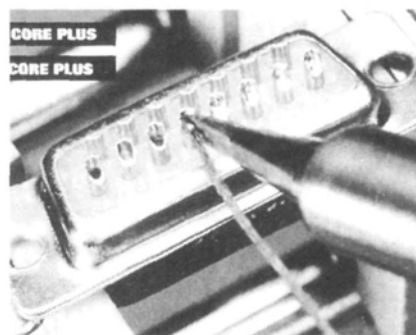
No-Clean Wire Solder

Alpha Telecore Plus No-Clean Wire Solder is now available from the Tool Resource. The Telecore wire solder was developed to meet the demands of electronic hand soldering. It's a low-residue core solder that contains a Water White gum rosin base with an efficient activator system that promotes the rapid solder

wetting of board pads, component leads and terminations. Although Telecore is designed to not need cleaning, it can be cleaned if necessary.

Part no.—STEL032; **price**—\$5.99/lb.

The Tool Resource, P.O. Box 1106, W. Dundee, IL 60118; (708) 468-0849.



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GAS CAR SPECIAL

A REAL

Lubes and greases are very important differential tuning aids. The diffs are packed with grease to alter their operational resistance. Special greases made by the buggy manufacturers are also available. Mugen diff and diff grease is shown here.

by JACK JOHNSON

1/8-Scale Off-Road Diff Tuning

LIKE 1/10-SCALE electric cars and trucks, the differentials in 1/8-scale gas off-road cars can be tuned to enhance performance, and they can have a greater effect on the car's handling than those in 1/10-scale cars. Unlike electric cars that have just one differential, gas cars have three, and each can be tuned or adjusted. Since all three work at the same time, things can get complicated.

AND IN THE CENTER RING...

The center differential probably has the biggest effect on your car's handling. If the center diff is too free, the car won't accelerate quickly because its weight transfers to the rear of the car as it accelerates. When this happens, the rear tires are under more load than the front tires, and this causes the center differential to send more power to the front wheels. Because there's no weight on the front end, when the front tires start to spin faster, the car doesn't accelerate, and the power is wasted.

Without a center diff to divide the engine's power between the front and rear end, the car won't handle bumps very well. It's important to achieve a good balance between acceleration and handling.

The easiest way to stiffen the diff action is to use a heavy grease, e.g., assembly lubes, bearing greases or special high-temp, high-viscosity greases. Most of these can be found at auto-parts stores. Grease with a high-temperature rating works well because it won't break

Several types of diffs are used in gas cars. The planetary diff is very popular and is used in cars such as the Mugen Super Sport and the Pirate. It's called "planetary" because it has small gears that orbit a larger "sun" gear.

"DIFF"ERENCE!

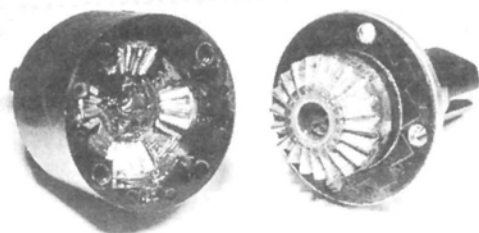
down as easily during long races.

A mitre gear diff, e.g., a Kyosho* Inferno diff, usually requires more grease to bind it than a planetary diff does. Planetary diffs are common in Pirate* and Mugen* cars. If you're using a mitre gear diff, pack the diff completely with grease. Try not to leave any air in it before putting it back together. If you're adjusting a planetary diff, you'll need less grease, because the diff's design causes the gears to bind up more under load. This means that the diff will not unload as easily. With a planetary diff, you'll be able to make a "finer" adjustment by varying the amount and viscosity of the grease. Kyosho also offers a range of silicone fluids designed for differentials (see sidebar).

The Kyosho center diff has a pressure adjustment that binds the diff and tightens the diff action. Don't rely totally on this adjustment; use the grease to make the most of the adjustment. If the pressure adjustment is used too much, the friction pad inside the diff can wear excessively. I've had the most success with Team Losi's* brown diff grease in the center diff. With this grease, you won't have to adjust the pressure on the diff too much—an approach that makes for a long-lasting diff setup.

If you're using a planetary diff, try the special greases offered by Pirate or

Mugen. They have been tested for this specific application, and they're used by most of the team drivers. Follow the instructions that come with these greases and remember that by varying the amounts of grease in the diff, you'll obtain different results.

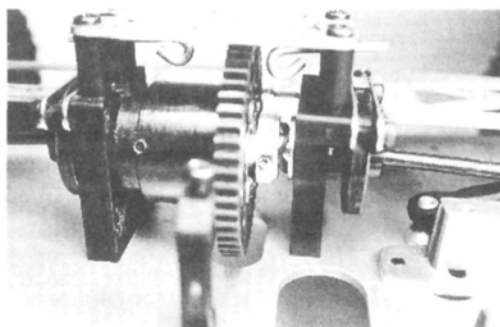


Kyosho's Inferno uses mitre gear diffs. This type of diff seems to work better when filled with silicone fluid than with thick grease.

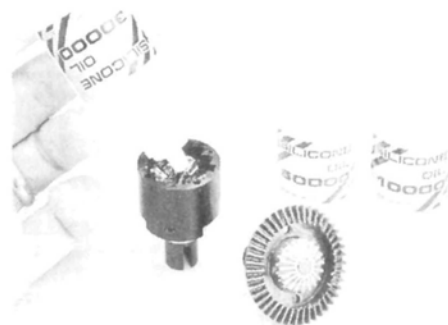
AND NOW THE FRONT AND THE REAR

The front and rear diffs don't have quite as much effect on the car's handling. Usually, these two diffs are identical, and they're adjusted by using grease or fluid. In general, set the front and rear diffs looser than the center diff. Although it's not absolutely necessary, you'll achieve the best overall balance by making the same adjustments on the front and rear diffs.

Generally, the freer the diff, the more off-power steering you'll have. The stiffer the diff, the more on-power steering you'll have. Don't allow the front diff to be too free, though. If the center diff unloads while accelerating through a corner, the front tires will spin faster. If the front diff is too free, the inside tire will spin faster than the outside tire. This results in a huge waste of power, not to mention increased front-tire wear. For this reason, some drivers adjust the front diff so that it's thicker than the rear.



The Inferno's center diff uses an adjustment screw to alter its stiffness. To stiffen the diff, simply tighten the screw to force the gears together.



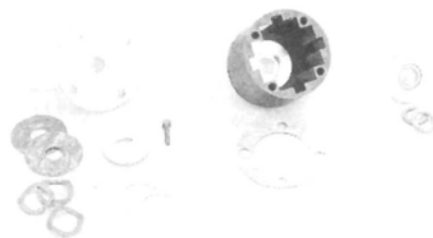
Kyosho sells an assortment of silicone fluids that are used to pack the differentials on the Inferno.

Tuning Inferno Diffs

Kyosho now has a full line of silicone fluids specifically designed for differentials. These fluids should be used with the new, sealed Inferno diff housings that have O-ring seals on both output shafts to help prevent leaks. The grease provides a fairly constant resistance to diff unloading, whereas the silicone fluids bind up the diff more as it spins faster.

Silicone fluids provide you with the best of both worlds as far as handling is concerned. The diff won't unload too much under acceleration, yet it will be very free when it drives through bumps and holes. Generally, a good combination is 30,000 in the center and 10,000 in the front and rear diffs.

Silicone fluid requires a little more maintenance than grease does because it isn't as good a lubricant as grease. After about an hour and a half of running, you'll have to replace the silicone fluid; otherwise, the gears in the diff will start to wear too much.



To accommodate the silicone fluid, Kyosho has upgraded its diff housings to include O-ring seals, which will prevent leaks.

K&S Engineering
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Soldering Tools



Model 1210



Model 910



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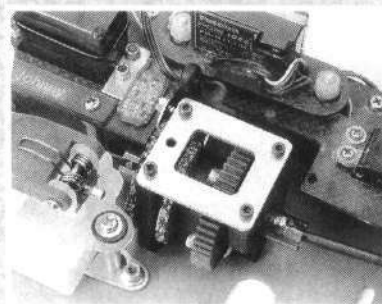
Model 212

- ★ Model 212 — Pencil type iron gives 30 watts capacity of fast heat for field repairs using a 12 volt battery for power.
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1/8- OFF-ROAD DIFF TUNING



Diffs or One-Way Bearings?

Pirate cars can be fitted with a center diff or a one-way bearing center-gear assembly. Each will make your car handle differently. The one-way assembly eliminates the differential and drives the front and rear wheels under power. When the car is coasting, the front wheels spin free of any drive-train drag. The one-way bearing assembly will give the car quicker steering response and will increase on-power steering. The downside is that the car is harder to handle on the bumps.

The center diff makes the car much easier to drive and more forgiving on the bumps. If you're just starting out, this is probably the way to go. For the serious racer, if the track is smooth, the one-way assembly is probably better; if the track is extremely rough, the center diff is probably better.

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PUTTING IT ALL TOGETHER

Just like any other tips or pointers that you pick up, it's best to try them before you make any final decisions. Knowing how to adjust your diffs just might give you the advantage you need on the track. Good luck!

**Here are the addresses of the companies mentioned in this article:*
Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826.
Pirate; distributed by OFNA Racing, 18 Technology, Ste. 159, Irvine, CA 92718.
Mugen USA, 7021 Veterans' Ave., Brooklyn, NY 11284.
Team Losi, 13848 Magnolia Ave., Chino, CA 91710. ■

EDITORIAL

(Continued from page 6)

Hey, I know that's why I became involved.

As loyal *Car Action* readers, you're probably aware of parking lot racing—a form of racing where entry-level on-road cars (like Indy cars and Formula 1 cars) run on makeshift courses that can be laid out on almost any paved surface. The premise of this activity is that the cars must remain box-stock, and only stock motors and "sport"-type battery packs are allowed. Right now, most of the activity is out on the West Coast, but I expect it to start spreading eastward very shortly.

Local clubs are setting up tracks in parking lots for their weekend excursions, and the fun and the enthusiasm of the races are drawing both new and experienced R/C car drivers. Members of California's Formula 1 Radio Control Enthusiasts (FORCE) club take on the car and the persona of their favorite F1 drivers! You may want to be Michael Schumacher one weekend and Gerhard Berger the next; it's just a matter of switching bodies. Chris Chan, one of the founders of FORCE and the publisher of the club's newsletter, says, "Everyone here is having fun. It's not about having the best battery, or even being the best driver. It's about having fun and making your car look real."

So far, parking lot racing has been well-received, and more and more clubs are sprouting up. I've heard of a club in Michigan where members actually duplicate the tracks of full-size F1 races! Will your neighborhood be the next to get bitten by the parking lot racing bug? Stay tuned to *Car Action* for more reports on this new and exciting segment of the R/C car hobby. Gentlemen, start your engines! ■

TRAXXAS TRX-3

(Continued from page 33)

ROAD-KILL

The first part of my testing took place down the road from the *Car Action* office at Sugar Hollow Raceway's new off-road track. This bumpy tri-oval didn't prove to be much of a challenge to the TRX-3's suspension, so I packed up my gear and headed to the Queens Off-Roaders track—a large indoor track in Queens, NY. This technical, clay-surface track was just what I needed to test the car's mettle.

The TRX-1's strongest feature is its suspension. Its long arms can soak up the largest bumps without upsetting the car's overall balance. But, I've found that this same attribute tends to make a car react more slowly to quick steering input. This problem has been solved with the TRX-3, and I'm pleased to report that very little of the

TRX-1's legendary stability was sacrificed in the process. I set the car's shocks to provide the "choppiest" handling, i.e., the shocks were in their most upright position, which provided greater resistance to chassis-roll. Ride height is also extremely important to the performance of the TRX-3. I learned that the car corners best when the rear ride height is set at "drive-shafts level" and the front height is set so that, when viewed from the side, the chassis slopes just slightly toward the front end.

The included mini-spike rear tires performed well, but I ended up swapping the Traxxas ribbed front tires for a pair of Team Losi* HT ribbed tires with the outer rib removed for more steering.

It's often difficult to gauge a new car's performance without spending a great deal of time learning how to drive and tune it properly. Cars are usually tested using generic ballpark settings provided by the manufacturers. Thus far, this method has proven to be a fair, accurate way to judge performance, because we're driving these cars as any typical consumer who doesn't have the knowledge of the factory drivers.

The TRX-3, in my opinion, is a markedly better car than its predecessor. It's more tunable, turns tighter, has improved shocks, and with its new body, it just plain looks cooler! On the track, the car delivers what its manufacturer promises: smooth, stable handling and improved steering response—the best of both worlds.

**Here are the addresses of the companies mentioned in this article:*

Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228.

KO Propo, 25-10 Sendagi, 3-Chome, Bunkyo-KU, Tokyo, Japan.

Novak Electronics, 18910 Teller Ave., Irvine, CA 92715.

JR Remote Control; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821.

Reedy; distributed by Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Airworks, 57 Valley St., Adams, MA 01220.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710. ■

NITRO NEWS

(Continued from page 76)

reassembling an engine using spare parts, make sure they fit properly. Several manufacturers change their engine specs slightly every year, and this makes the older parts useless.

After several races, these prep practices will become almost second nature, like knowing when a battery pack is about to dump. Most important, don't think of learning new gas techniques as schooling, 'cause everybody knows that smokin' (nitro that is) ain't allowed in school. ■

ADVERTISEMENT

TEAM LOSI

TECH TALK

NEW GOLD COMPOUND TIRES

As R/C racing cars have become better, the demand for improved tires has increased. Getting sufficient traction on very hard-packed, dry surfaces has been the biggest challenge facing tire manufacturers. Current soft rubber compounds just don't provide enough bite. We think that we've solved this with our new Team Losi Gold compound tires.

On very slick, hard tracks, you need tires that use the stickiness of their rubber compound, not just their tread design, to gain traction. The new Gold tires are made of an exclusive natural rubber compound that's so soft and goeey that you can actually stick the tires together!

To ensure that each pair of Gold tires provides maximum performance, we ship them in heat-sealed, ozone-free packages so that they're just as sticky when you place them on your car as they were when they were manufactured.

And you've probably heard that soft-compound tires work better when they're used with foam inserts. This is true, but you won't have to spend extra dough when you use Losi Gold tires because they come with our new Clouds foam tire inserts—at no additional charge!

THE RIGHT WAY TO BUILD HARD-BODY SHOCKS

Here's an easy method for those of you who are having trouble filling your hard-body shocks with the right amount of oil: fill the shock body up to its threads, then install the shock cartridge in the body, but screw it in a couple of turns—just enough for the threads to catch. Hold the shock horizontally, and push the shaft all the way in. Excess oil should bleed from the area between the shock cartridge and body. Continue to compress the shock, and screw the cartridge all the way in. If done correctly, the shock shaft should be "sucked" back in about 1/2 inch when pulled out. Your shocks are now perfect.

* * *

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

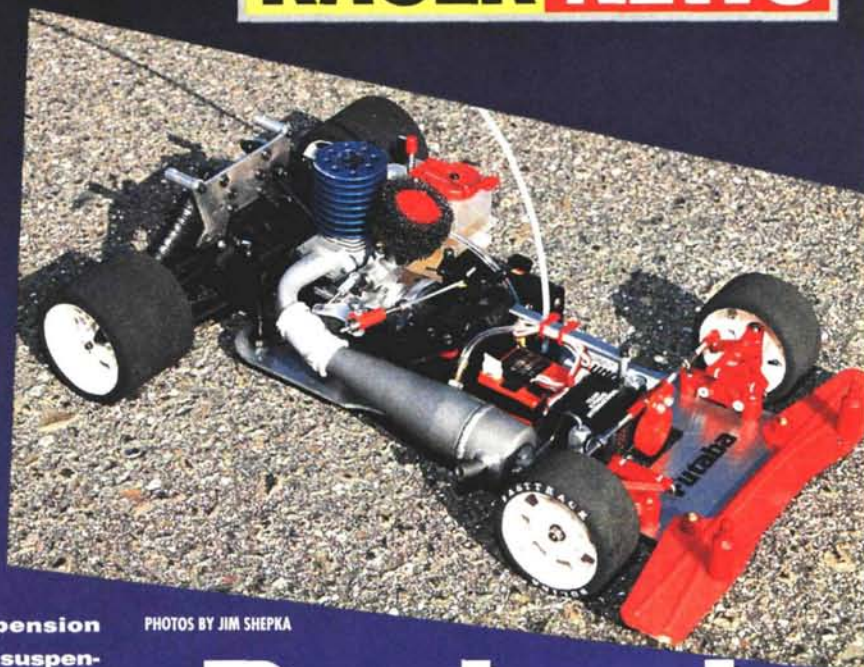
by JIM SHEPKA

WHEN I TESTED Kyosho's 1/10-scale Nitro T-Bird (November '92 issue of *Car Action*), I wrote that it was a great way to get into gas without spending a lot of cash. I also said that I couldn't wait to hit the after-market product catalogues to turn the T-Bird into a real fire-breather.

As you may have surmised, I've made good on my promise, and I'm back to show you what I've done to this once mild-mannered stocker.

The basis of my modifications is the Dan's R/C Stuff[®] Americana chassis-conversion kit for all Ultima-based Kyosho gas cars. This kit allows you to replace the Nitro Bird's independent, front, A-arm suspension with almost any other 1/10-scale pan-car front suspension. A pan-car front suspension has a much lower profile than the stock pieces, so you can use almost any available 1/10-scale body design.

I also learned that Duratrax[®] and Kyosho[®] offer an extensive line of hop-ups both for the T-Bird chassis itself and for the O.S.[®] CZ-R engine. Naturally, I contacted both companies when planning this project.



PHOTOS BY JIM SHEPKA

Project Nitro T-Bird



**Frequent
flyer**

CONSTRUCTION

To begin the conversion, I had to strip components off the original chassis plate and mount them on the Dan's chassis. This allowed me to give everything a once-over, and it was a good time to clean the bearings and motor and to re-pack the gear case with fresh grease.

Like the original, the Dan's chassis plate is made of T-6 aluminum. The big difference is that the Americana chassis is flat, whereas the front of the stock chassis is "kicked up" to accept an off-road-type suspension.

Because it's completely flat, the Dan's chassis will accept any front suspension that fits the Associated 10L. I opted for the new Associated* adjustable camber/caster front suspension. I replaced the stock steel screws with a complete set of aluminum replacement screws.

Before mounting the suspension, I dyed the blocks, the front bumper, the body posts, etc., using red fabric dye. Not only does the color enhance the car's appearance, but boiling the nylon components makes them more durable. With the speeds I expect this car to reach, any increase in strength is a plus.

I had soon replaced most of the suspension and drive line. While I had the rear end disassembled, I replaced the stock dogbones with a set of Kyosho universal swing shafts and a steel final drive gear from Duratrax. While I was in there, I also installed a Thorp* after-market differential.

The chassis went back together quickly, leaving the motor mods to work on. I was due for a clutch replacement, so I popped off the E-clip, removed the drive gears and replaced the badly worn clutch and the clutch-shoe retaining spring. The spring doesn't cost much, and it's best to replace it when you replace the clutch, because over time, it can lose its compression force.

The completed project. Bolink black-dot tires help the car rocket through the turns, while the Paris pipe gets the revs to stand at attention. My next hop-up item will be a Thorp disk-brake-conversion kit. With the speed I have now, I'll feel safer when I have more stopping power.

PIPE DREAM

I also checked the piston, the sleeve and the slide-valve carb to ensure that everything conformed to the specs and was clean and well-lubricated. I really wanted to increase the motor's performance, so I replaced the stock manifold and muffler with high-tech units. Duratrax offers a bolt-on replacement manifold, and I added a Paris* tuned pipe for maximum horsepower.

The manifold had an S-bend in it, and that didn't meet my needs, so I cut off what I didn't need. Then I slipped on the silicone collar and positioned the expansion chamber along the right side of the chassis, and I used piano wire to secure the front end of the pipe to the chassis. It was a pretty straightforward production.

TOUGH BRAKES

Obviously, if you hop-up a car's performance, you must have brakes that will stop it as quickly as it accelerates. The original brake unit has more than ample stopping power for the stock setup, but Thorp offers a disk-conversion kit, and those in the know say it provides more stopping power with less drag on the motor.

There are two possible mounting positions: directly in front of and to the side of the flywheel, or toward the back of the motor. Unfortunately, I couldn't mount the system (which is attached to the drive shaft) near the flywheel because the new manifold and tuned pipe took up the space.

Option two looked promising, but it meant that I had to remove the pull-starter—no big deal, because that was the next modification on my agenda anyway! Why remove the pull-starter? Because, when you remove the starter assembly, you also get rid of the one-way bearing that's attached to the end of the crankshaft, and, in theory, you'll reduce rotating mass, drag, etc., when you do this.

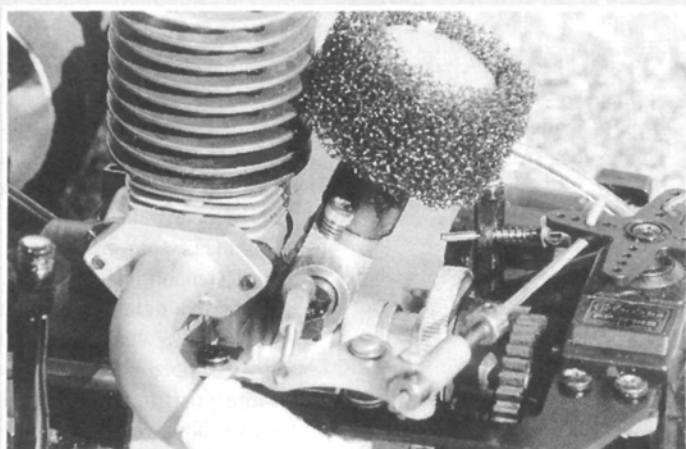
One slight drawback: with the starter removed, I couldn't find the proper backplate for the CZ-R motor. Without it, I had to leave the pull-starter in place. My only option was to stick with the stock brake

setup until I could find a suitable backplate. I hear that the Thorp unit is good; I hope to plan better next time—and report on it!

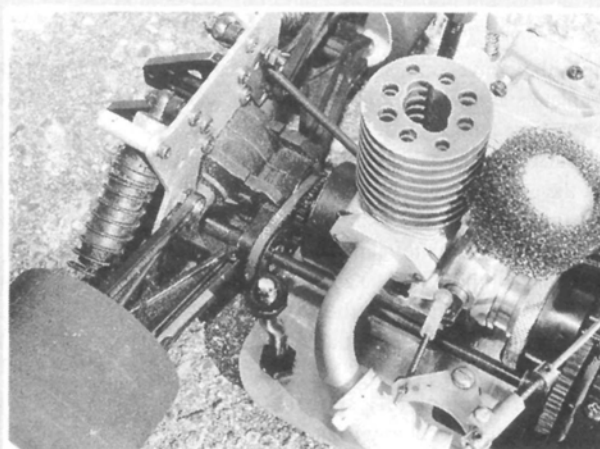
PARTS LIST

Bolink	Foam tires—black dot
Dan's R/C Stuff	Americana conversion chassis—part no. C101
Duratrax	.12 CZ-R exhaust header—part no. DTXG1101
	.12 CZ-R filter—part no. DTXG2600
Kimbrough	Large servo-saver
Kyosho	Option House universal swing shafts—part no. W-5061
	Steel final diff-gear clutch bell 12- to 17-tooth timing pulleys—part no. FD-51

Paris Racing Products	1/10 mini quiet pipe—part no. AL110
Protoform	Peugeot Can-Am 1/10-scale body
Team Associated	Front bumper—large
	10L Dynamic Strut front suspension
Thorp Mfg.	Rampage ball differential—part no. 6050
	Rampage Outlaw brake—part no. 6060



A coarse Duratrax filter stops anything nasty from going into my carburetor. This inexpensive little item could save you money in the long run by extending the life of your engine.



The Duratrax manifold had an S-bend that I didn't need, so before bolting it on, I cut off the excess, slipped the silicone collar over the remainder and added a Paris tuned pipe.

TESTING

**Throttle response
was outstanding,
and the smell of
nitro in the air
made me delirious
with excitement.**

Protoform* provided a Peugeot Can-Am body that's ideal for the conversion. Its sleek lines and low-slung stance make it a very authentic-looking roadcourse racer. With Bolink* back-dot tires all around, the fuel tank topped off and the receiver batteries at full charge, it was time to get busy.

I live right next door to an Air Force Reserve base, so I have no problem finding a big enough test area. But my biggest fear is messing up the flight tower with my FM transmissions and having a C-5A cargo plane squash me like a bug! (Just kidding, FCC!)

Amid the roars and howls of C-5s, C-41s, C-130s and assorted attack aircraft and choppers (it was reserve duty weekend!), I managed to find a quiet enough (read: *safe!*) spot to do some testing.

A couple of quick rips on the pull-starter breathed life into my asphalt burner. I had

already broken in the motor for my first review, so I was ready to tear up some serious blacktop.

The T-Bird's new-found agility struck me immediately. The new Associated front end really makes it easy to adjust the setup. The steering was precise (the body style has a lot to do with that), throttle response was outstanding, and the smell of nitro in the air made me delirious with excitement.

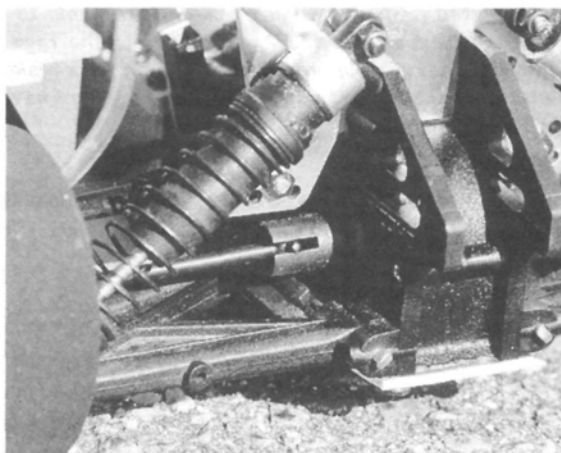
With a wide range of gear pulleys and clutch bells available, you can gear the 'Bird to move a mountain or assault the sound barrier!—pretty interesting possibilities!

CONCLUSION

This is one of the simplest forms of gas vehicles to get involved with, and the Americana conversion makes it even better—easier to work on and operate; easier to go fast. And it's relatively easy on the wallet. With the wide range of available after-market products, the possibilities are endless. I can't wait to mount a NASCAR body and try my hand at the really big superspeedways. Stay tuned!



Thanks to the T-6 aluminum Americana chassis from Dan's R/C, you can replace the T-Bird's independent front A-arm suspension with almost any other 1/10-scale pan-car suspension system. I opted for Associated's new adjustable camber/caster front suspension.



When I had installed the new chassis, I replaced the stock rear dogbones with Kyosho universal swing shafts, and while the gearbox was disassembled I traded in the stock differential for a hi-zoot Thorp unit.

**Here are the addresses of the companies mentioned in this article:*

Dan's R/C Stuff, 9525C Cozycroft Ave., Chantworth, CA 9134.

Duratrax; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826.

Kyosho/Great Planes Model Distributors.

O.S.; distributed by Great Planes Model Distributors. **Associated Electronics Inc.**, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Thorp Mfg., 4054 E. Mission Blvd., Pomona, CA 91766.

Paris Racing, 4254 Independence St., Chino, CA 91710.

Protoform, 537 Niagara St., St. Catharines, Ontario, Canada L2M 3P6.

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245. ■

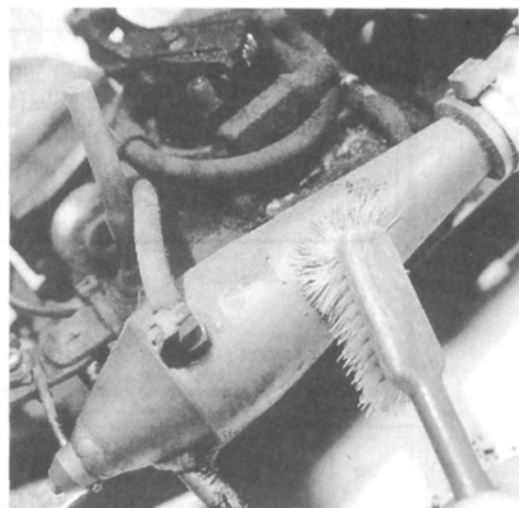


yikes...what a mess!



Cleaning gas cars

Some of the items you'll need to clean your gas car: a few old brushes, some denatured alcohol, spray bottles, some old rags and a light oil (such as WD-40). An air compressor or canned compressed air will make the job easier.



Don't forget to wipe off any excess dirt on your exhaust pipe as soon as you've finished running your car/truck. If you don't, the heat can cause the debris to harden on the pipe's surface, and it will be more difficult to remove.

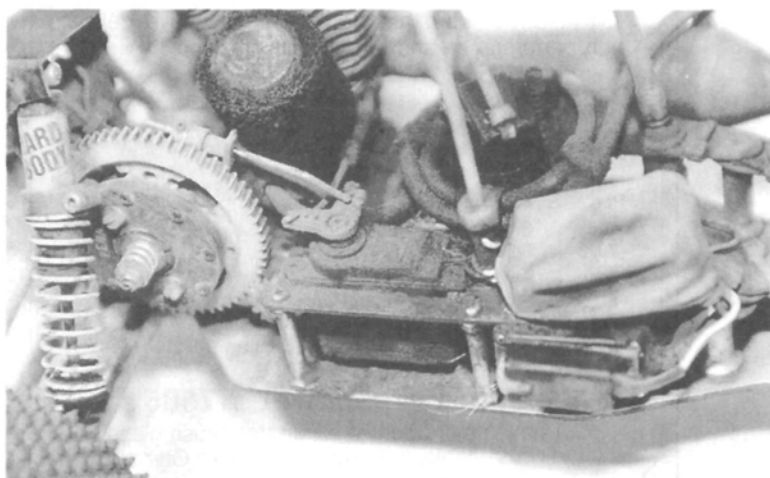
by JACK JOHNSON



Several types of air filters are available, but they're all similar in design. Proper cleaning and oiling will ensure long engine life.

Filter Maintenance

The foam filters used on small R/C motors are very similar to motorcycle filters. This means that most of the motorcycle filter cleaners and oils can be used on our filters. Several types are available, but any foam-filter oil and cleaner should work. The oil really helps keep dirt and dust out of the carburetor, and the cleaner extends the filter's life.



What a mess! But after a little TLC and routine maintenance, your buggy or gas truck will be as good as new and ready to hit the track once again.

of the newly designed 1/8-scale cars also have a single radio-mounting tray that can be removed with a few screws, and that makes cleanup even easier.

WHERE DO I START?

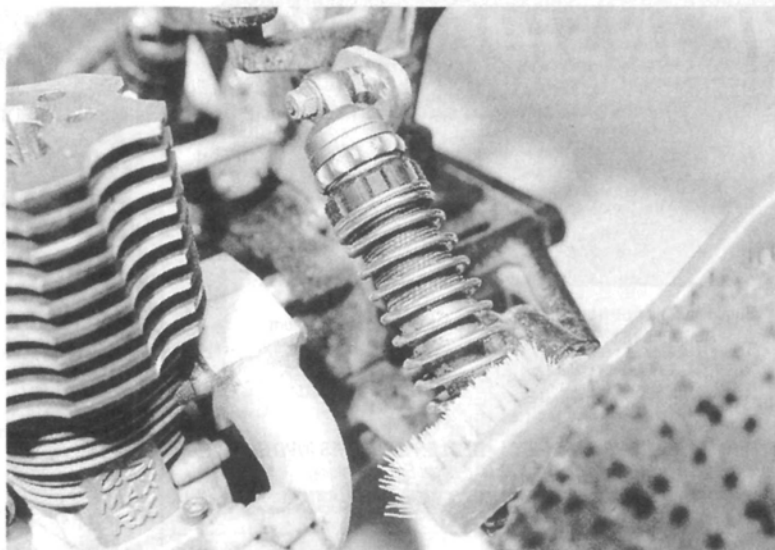
When you've finished running your car and you're ready to clean it, round up the following things: an old, medium-size paintbrush, an old toothbrush, some old rags, some denatured or rubbing alcohol in a spray bottle and some WD-40 or its equivalent. Access to an air compressor or some cans of compressed air will make your life much easier.

Brush off as much of the loose dirt as you can with the old paintbrush, and clean out the hard-to-reach places (as well as around the shock seals) with the toothbrush. Then spray the entire car with alcohol—*especially* the really dirty areas. (You can also use a cleaner/degreaser instead of the alcohol.) If your car has a removable radio tray, it's a good idea to remove it before you spray. If you can't remove the radio, take care not to get the receiver wet and not to get the alcohol into the air filter or carburetor; it wouldn't hurt to put a small plastic bag over the air filter. Once you've sprayed the entire car, blow away the dirt and grime with an air compressor or a can of compressed air that has a spray nozzle, until the car is completely dry. If any dirt remains, repeat the cleaning process.

When the car is reasonably clean, spray WD-40 or an equivalent spray lube onto it. I know this sounds crazy; believe me, I questioned it myself until I tried it. Admittedly, dust does stick to the oil, but it will come off more easily the next time you clean. Trust me, I do this all the time. Another advantage to using the WD-40 is that it keeps the suspension arms and other moving parts operating smoothly. After you've sprayed the car, blow it off again with the compressed air. If all goes well, your car should look almost new.

ROUTINE MAINTENANCE SCHEDULE

Some parts of an off-road gas car



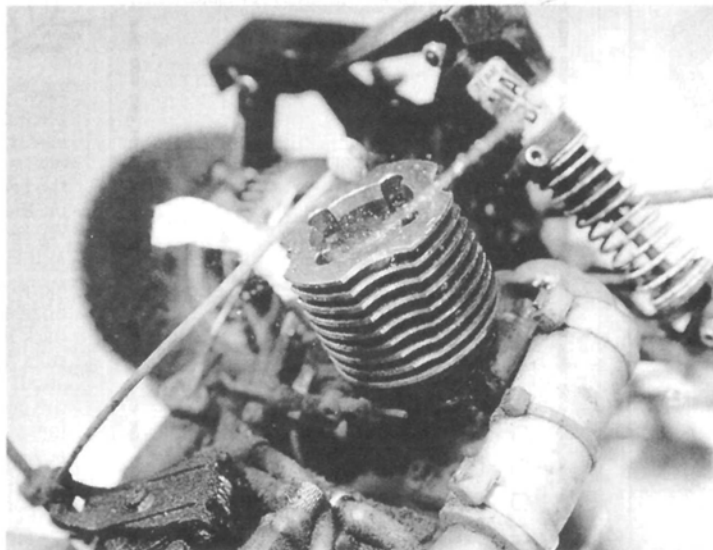
Brush the dirt off your shocks with an old toothbrush. Any dirt that's left on the shock shaft can enter the shock body and damage the seals, and then you'd have to rebuild them.

should be checked or replaced regularly. The clutch bearings are good examples. The bearings not only experience extremely high rpm, but they're also exposed to very high temperatures. They should be checked after about every hour-and-a-half that you run the car. Both plastic, caged roller bearings and ball bearings should be greased well regularly.

CRUEL SHOES

While you have the clutch bell off, it's a good idea to check on the condition of the clutch spring and shoes. If the clutch shoes look extremely worn, they should be replaced. Clutch shoes have a fairly long life expectancy, but the clutch spring may wear out faster. If it's a coil spring, check for any kinks in the coils; if it's stretched in one spot, you should probably replace it. Clutches that use "mousetrap"-type springs (common on the three- and four-shoe clutches) usually last much longer.

(Continued on page 120)



Spray some denatured or rubbing alcohol onto the cylinder head. Don't spray any of it into the carburetor or onto the air filter, and be especially careful that none of it splashes in your eyes.

Extra Protection

It never hurts to have a little pre-race strategy: there are many spray cleaners and conditioners, and I've found that a few of them—Son of a Gun (STP), Formula 2001 and Armor All—come in handy with gas cars. They're especially helpful when I race in the rain. (If you've ever had to race in the rain, you know what a mess it can be.) If you cover your entire car with one of these sprays before you hit the track, cleanup will be much easier. They form a very slick layer, so dirt—and especially mud—doesn't stick to your car. When you clean up, the mud seems to just fall off. (Even when I use the sprays, I still clean my car with alcohol and WD-40.)

If you know you're going to race in the mud, put some balloons over your shocks. This will prevent the mud from building up on the shock shafts, damaging the O-rings, and ultimately causing the shocks to leak. This can have a very negative effect on the car's handling over the course of a long main event.

PHOTOS BY JOHN HUBER



Bud McGrew's handiwork is typical of the FORCE F1 group.

Parking Lot Racing

by Chris Chan



RADIO CONTROL car racing can trace its beginning to the parking lots of Orange County and the San Fernando Valley. Starting with Norb Myers, George Sloss, Charlie Eckels and a handful of other pioneers, R/C racing began in 1968. Other than the old Thorp track in Pomona and Bill Rattey's raceway south of Boston, if you wanted a place to race, you went looking for the biggest, flattest paved asphalt.

As recently as the early '80s, parking lots were the staple of R/C car racing. Legendary parking lot tracks included the Indy R/C Club's Castleton Mall, which hosted an 1/8-scale World Championship, and SCAR's Briggs Cunningham Museum site in Costa Mesa. By the mid '80s, the R/C racing boom was in full flower, and raceways and permanent facilities began to sprout up across the American landscape. Unfortunately, the boom is well over, the track down the street is closed, and it's time to find a new place to play—and, in my case, a pair of new 1/10-scale F1 cars to play with.

**A low-cost way to put
some fun back in your
racing and attract
newcomers to R/C!**



**HobbyTown USA, Irvine, CA. There
aren't any drivers' stands in park-
ing lot racing!**



**The podium for
round 4 with
(left to right)
Jim Walls, "Tim
Aliso" and "Mike
Andretti."**



**Brent, the
kid I take to
races with
me, leads
the FORCE
Futaba F2
category for
novices.**

**The Tamiya 4WD
Touring/Rally car makes
a single-brand class one
I'm anxious to get into. A
BMW M3 EVO is on the
workbench for use as the
FORCE "safety" car.**



the racing rules

Parking lot racing rules are generally pretty liberal. Motor, battery and accessory choices are up to the driver in gearbox, direct-drive, truck and 4WD. Ironically, the exception is F1. F1 was initiated by HobbyTown as a box-stock, spec class.



FORCE has taken these rules a step further and established a short list of do's and don'ts. All Kyosho and Tamiya 1/10-scale F1s are eligible and can only use factory (read Kyosho or Tamiya) upgrades in the current FORCE Series. Exceptions to the rule are linkages, gears and tires (stock wheels must be retained). Reedy Force II stock motors are being used as the spec motor in the series for the F1 class, while the F2/Novice category uses an 05, sealed-endbell motor (usually included with the F1 kits). These rules have proven to be easy to enforce and amazingly, almost everyone is anxious to cooperate. The only technical limitations are minimum weight (36 ounces) and tire diameter (2 inches). The 1400mAh batteries were also standardized, but that sort of thing is pretty difficult to police. The beauty of the parking lot tracks is that batteries aren't really part of the equation in going fast. F1 heats are 5 minutes, the same as in Europe and Japan.



Rene Cortez shows the right setup for PLR. Toolbox, folding table, Land Cruiser...

THE TRACKS

HobbyTown USA, in Irvine, CA, (or Hobby Spa, as the local racers refer to it) is the driving force behind the resurrection of parking lot racing in Orange County. It didn't hurt that Irvine is also the home of R/C companies such as Futaba, Irvine and Airtronics. Owner Eric Sands and his merry band started it off by blasting around the alleys behind the Crossroads Shopping Center, where his store is bookended by a Mervyn's and a Target store. Eric then got himself a home-built, second-hand computer lap counter, some used fire hose, some discarded plow disks and a sprayer filled with his favorite Dr. Pepper-and-alcohol traction cocktail.

After convincing the mall folks and The Irvine Company that there was no evil intended in the venture, Eric arranged to use a small section of the parking lot and started holding races every Sunday. Just a few off-ramps down the 405 freeway, Aliso Hobbies, in Laguna Niguel, took the same basic setup and added an up-to-date Autoscore system (which HobbyTown now has, too) and veteran race announcer Ron Williams (formerly of RCHR). Aliso puts on the show on the first three Sundays of each month. Bob Sarnell's Victory Speedway, in the San Fernando Valley, has also joined in on the fun and alternates Sundays with the Ventura Roadrunners' Freedom Park, Camarillo track. That's four tracks already running similar classes and races on four distinctive surfaces. Combined with the indoor carpet of MnM



FORCE rules clearly state that all cars must have drivers.

Raceway in Corona, things started to look interesting.

THE CARS

Open practice can be a bit daunting for the F1 bunch, what with monster trucks, RC10Ts, EV10s and 4WD touring cars all on the course at once for the R/C equivalent of Formula Libre. Parking lot classes include everything on 1/10-scale wheels: gearbox, truck, direct-drive, F1 and 4WD. At the Victory Speedway round of the FORCE (Formula One Radio Control Enthusiasts) Series, there was also a 1/10-scale gas class run. The FORCE group, which Dave Berger and I have organized, has adopted the F1 class as the most fun, but all the classes are well-supported.



Rumor has it that the two Daves—Jun (left) and Berger (right)—might be joining forces on Team McLaren. We do know that Jun's new MP4/8 will not be a K-car.

Limited traction and tight, short layouts don't put a premium on run time or horsepower, so the cars generally run close to stock with typical over-the-counter upgrades. This brings us to my favorite subject: the rules.

THE RACING

On the one hand, you've got your racers. On the other, you've got your hobbyists. And then there are those FORCE guys who enter as Mike Andretti, D.J. Blundell, More Asuselman and A.S. DeSilva. And they all show up around 8:30 in the morning, pop open the hoods of their cars, hook up their chargers and sign up. They pay \$5 a class to race for ribbons or dash plaques and the bragging rights to the playground. The program consists of two qualifiers and a Main for everyone. Incredibly, by 1:30, the track is gone, cars are parking in the lot, and you are outta there! No more all-day affairs. No more having someone watch your stuff while you try to find somewhere to eat. This kind of racing is definitely fun!

KYOSHO'S INDYCAR

I first got wind of Kyosho's Indycar project from Big Bill Jeric, who said to look for a new entry in the spec-class wars wearing a Lola T3900 body. We've been racing the Kyosho 1/10-scale F1 chassis in the FORCE series, and you've read about the Jordan/Yamaha and Williams/Renault K-cars in past issues. But this new effort was to be a truly international one, with the polycarbonate shell sourced out to Andy's and the detailing sticker sheet from



The T3900's rear suspension will look familiar to pan-car owners. It's molded rear pod attaches to the chassis with a T-plate, while a single shock provides damping.

Arie put the full-size red-and-black car on the pole for the World's Biggest Racing Spectacle.

The Kyosho F1 chassis has already proven itself to be quite competent in competition, having won Round Two of the FORCE Series at Cam Marino in the hands of David Berger, and Round Five at Victory Speedway with Dave Walsh. Most impressive though, was probably Jim Wall's second-place finish in Round Four at the Alisodromo. Wall's performance with a box-stock Kyosho Sasol Jordan was nothing short of incredible on one of the fastest tracks FORCE runs on.

But what fun is box stock when Kyosho has a shop full of trick stuff that bolts right on and fits nicely under the FORCE rules of allowing expert class, super-licensed drivers to run *any factory upgrades*? Daves Walsh and Berger were quick to equip their Lotus 103B and McLaren MP4-8 with the full active setups—namely carbon-fiber chassis and axles, machined-alloy motor mounts and chassis stiffeners, ball bearings and diffs. I decided to do the same to my Kyosho Williams FW15 and found myself winning my first race in over a decade and then earning my first points in the FORCE series.

BUDGET BUILDUP

Thoroughly convinced that this setup works, the Lola was built up to those specs, with the chassis (KYOC2885), Duraluminum axle mount (KYOC5101), special radio post set (KYOC4909), ball bearing set (KYOC2228), F1 oil shock (KYOC4705) and ball diff (KYOC2173)

Autographics. On top of that, Kyosho had signed an official licensing agreement with Chip Ganassi Racing to market the Lola kit as Arie Luyendyck's Target/Scotch T3900 Ford, and to have it ready to roll before the Indy 500 at the end of May.

Well, they pulled it off. The Kyosho Target Lola was on the shelves on schedule, and as a bonus,

adding on about \$100 to the cost of this \$109.95 car. F1 racing being pretty popular, I couldn't find a Kyosho carbon rear axle, but was pleased to find out that the Tamiya 6mm glass fiber rear shaft (53091) fits with slight alteration to the flat spot position.

When I started the project, I was still a little unsure of exactly what I was setting the car up for. Banana Dan had mentioned that the F1 class might be part of the '93 Thunderdrome, so the thought of an open-wheeled superspeedway machine was one thought. The problem was I had been there (the very first Thunderdrome in Encino was *only* for open wheelers), and the body kit with the Lola was not the low downforce Indy configuration. Rather than put even smaller wings on a car that could use as much downforce as possible, I decided to use the car for parking lot road racing. For radio gear, I selected a Futaba PCM system, which can be used with an in-car antenna, an S9601 steering servo and a Novak 410-HPc speed controller.

Assembly of the chassis went very quickly, with Kyosho's ever-improving instructions and having built two other K-cars in the past few months.



The Lola's front suspension is a float-kingpin type, but its molded arms are designed to look just like those of the full-size car. The plastic chassis stiffener also protects the radio gear from grime. (Kyosho Jordan Yamaha shown).

BODY BY ARIE

The Andy's body takes a bit of artistic license in the width and profile of the rather bulbous airbox, but the overall effect isn't bad at all. The one major problem would be those little winglets on the trailing edge of the side pods. A distinctive Indy car for several years, they require you to cut

and tuck the side pod into the body for realism. This, in turn, eliminates the platform area below the winglet. While all this can be accomplished without too much fuss, the tip of the winglet must be removed if you plan to race, because it will cut right into your rear tires the first time you hit a bump. In order to make sure that this doesn't happen, you have to pretty much trim away the whole flap.

The regulars at HobbyTown include kids like Justin Davenport, who keeps his mechanic/dad busy maintaining his F1 and Tamiya 4WD cars. Other weekends, you might find the man who saved your servo, Chuck Kimbrough, or Novak's Tyree Phillips, Tamiya's Dave Jun, or Maxmod's

Boyd Gaebel. While much of this is due to the geographics, parking lot racing does have a nice mix of career novices, moving chicanes and old vets. Some pros, like Barry Baker, have had a little trouble dealing with the scaled-down intensity of parking lot racing.

Bakereto blew away the field in the inaugural FORCE round at Aliso Carlo, but found the moody tarmac at Hobby Spa not to his liking. Round-four winner Tim Bump is also part owner of Aliso Hobbies, and the list of World and National drivers with F1 cars

(Continued on page 144)

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KYOSHO INFERNO ST

(Continued from page 56)

that circles the infield track (till the engine was up to operating temp); then to the six whoops, which it sucked up in two spurts—wow! Triple, triple—right out of the box. Only a 7-cell with a modified could do that.

Next came a hard left with a fast run at the infamous tub jump. Yeeooww! It caught so much air that it landed in the next turn. Cool! Throwing the ST into a high-speed slider is an exercise in point-and-shoot driving. The next part of the track is my favorite because it's wide open and has a set of double jumps 10 feet apart. Baaalooy! Dirt flew everywhere, and the front bumper/skid plate showed its worth when the front end blasted over the first jump with enough air speed to clear the second jump easily.

Back on the outside of the track, the speeds were so insane I caught myself drooling like

Homer Simpson at a chocolate factory. This, my friends, is the greatest! Ivan Stewart eat your heart out.

After using a few more tanks of fuel, I gave the Inferno a break to see how it had fared on the torture track with Wally Winkle at the wide-open controls. Much to my surprise, a close inspection revealed only that one tire had come partially off a wheel (not enough glue).

The shocks were a little on the weak side for the jumps I tried, but these jumps are pretty extreme. They didn't fade or weaken even though I ran through tank after tank of fuel.

On the Wally Winkle scale of yuck per buck, let's just say that I'm working on an entirely new scale.

**Here are the addresses of the companies mentioned in this article:*

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61626.

DuraTrax/Great Planes Model Distributors (see above).

Blue Thunder; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821.

K&N Engineering Inc., P.O. Box 1329, Riverside, CA 92502.

CLEANING GAS CARS

(Continued from page 109)

BREATHIN' EASY

The air filter is one of the most important parts on an off-road gas car, and it should be kept as clean as possible. You can do this with a filter cleaner and a good filter oil that will keep fine dust and dirt from passing through the filter. If dirt gets through the filter, it will enter the carburetor and eventually find its way into the motor; this can damage or even ruin it. If the filter ever comes off while you're driving, stop immediately, before any dirt can get into the motor.

The outdrive cups should also be looked

(Continued on page 44)



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TRUCK STOP

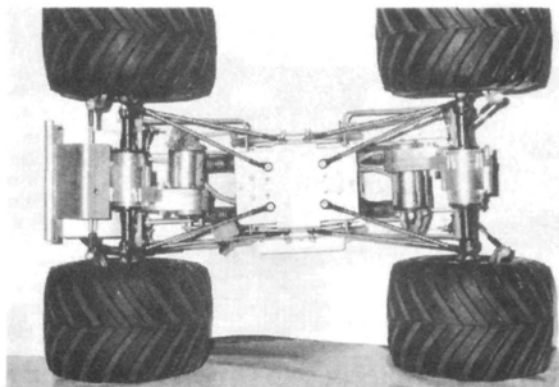
KILLER CLOD-A-LEAVER

by JOE LEFFELMAN

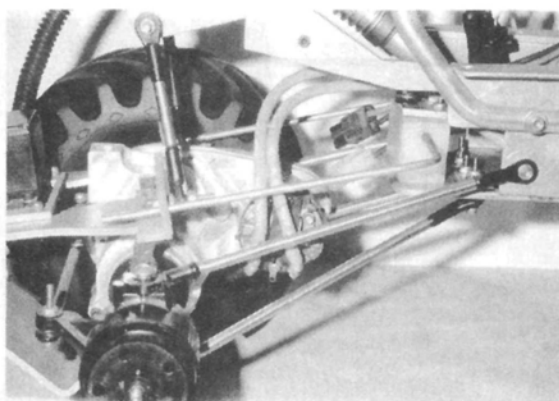
I DIDN'T HAVE my first Clod truck for very long before I started to modify it. When I decided to replace the stock suspension, I compared the brands out there. I passed on PDI's (Product Design Inc.*) Clod-A-Leaver suspension kit because it was more expensive. Since then, I couldn't help but notice that the majority of top finishers at the NRCTPA Worlds were using the Clod-A-Leaver. Was it really that good? If so, why? I talked to Larry Bennett of PDI, and he was kind enough to let me find out for myself.

This kit takes some time to put together—after all, it has over 300 pieces and 13 pages of instructions. All of the installation hardware is included. You can use this kit with stock or after-market chassis. I don't have room to tell you about the complete assembly, so I'll highlight some of the major points. With the Clod-A-Leaver kit, the steering servo is placed in front of the truck, and it's mounted on an aluminum plate. It looks different, but I don't think you can get more accurate steering. (Rear steering is an option.) The ladder/suspension bars are $\frac{3}{16}$ -inch stainless-steel rods that should be nearly indestructible. Clod-A-Leaver also has a cantilever-type shock system (shocks aren't included) that should give plenty of wheel travel.

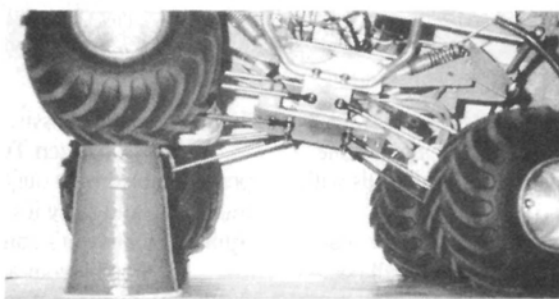
I really liked the fact that all the provided nuts are the nylon locking type; they won't come loose no matter how roughly you drive. The front and rear torsion bars help keep all the wheels on the ground, especially in tight turns.



With the truck flipped upside-down, you get a peek at the burly $\frac{3}{16}$ -inch stainless-steel ladder/suspension bars and the aluminum plate that protects the front-mounted steering servo.



The front and rear torsion bars help to keep the wheels on the ground. I use a $\frac{1}{10}$ -scale steering servo, but a $\frac{1}{4}$ -scale servo could also be used.



PDI's Clod-A-Leaver suspension kit can take your truck over the roughest terrain. Although the kit contains a ton of parts (over 300!), it's relatively easy to assemble.

Heavy-duty, 6-32 ball links for all the pivot points are also included.

HAMMER TIME

When I first tested the truck, I took it easy and just drove it in circles and figure-8s. I really noticed the accuracy and stability of the steering. As I mentioned, the servo is mounted on an aluminum plate in the front of the truck. It's pointed downward, and a stainless-steel rod goes from the right side of the servo-saver directly to the right front wheel. Steering response is quick, and the Clod doesn't have any bump steer. I drove the truck over some very rough terrain, and the steering didn't give at all. I use a standard $\frac{1}{10}$ servo, but you could also use a $\frac{1}{4}$ -scale servo with Clod-A-Leaver.

When I turned the truck at high speeds, the torsion bars kept all the wheels on the ground. Previously, the inside front tire tended to lift when the Clod made a high-speed turn. The torsion bars also helped to keep the truck level for good landings when it traveled over very rough ground.

The cantilever shock system has plenty of suspension travel. The chassis can be lowered by replacing the rod that goes from the axle to the pivot arm. The cantilever setup absorbed all the bounces and jumps I could give it. The torsion bars and the cantilever system work well together. At times, I'd hit a rough spot and the truck would go airborne, almost sideways, but it always landed nicely. I only managed to roll it once, and I had a hard time

doing that. With the proper shock setting, the truck has very little bounce.

I really enjoyed checking out the Clod-A-Leaver, and I'm sure it can take the abuse some of us like to give our trucks. So, if you're contemplating buying it, think about everything that it comes with before you think it's a little too much for your wallet.

TECH IDEA OF THE MONTH

I've been told that Custom Racing Products* no longer makes R/C car and truck products. One item they made especially for us monster truckers was their adjustable motor mount. It was very handy if you wanted to use a bigger or smaller pinion gear. So here's an idea you might want to try.

There are two holes in the gear case for mounting the motor: one on the top and one on the bottom. I used a drill bit the same size as the screw hole and carefully lengthened the hole at the top of each side of the gear case. I drilled in a slight downward arch to follow the direction of the motor screw. I only did this to the top hole; there's no need to drill the bottom unless you plan to use a very big pinion gear. When I had finished, I installed a washer on the top screw. Don't lengthen the hole too much; I went a little over 1/8 inch, and I can get a 17-tooth pinion gear in with ease. I had to go this route when I mounted my steering servos on the gear cases, because the motor mounts were in the way. If you need to use a bigger pinion in your truck, this is a very economical way to do it. So, till next time, keep it clean and have fun.

*Here are the addresses of the companies mentioned in this article:
Product Design Inc., 16922 N.E. 124th St., Redmond, WA 98052.
Custom Racing Products, 8784 Plata Ln., Atascadero, CA 93422

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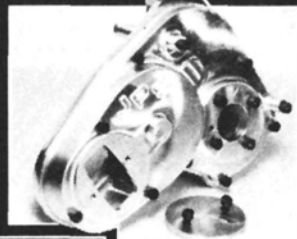
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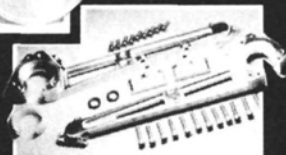
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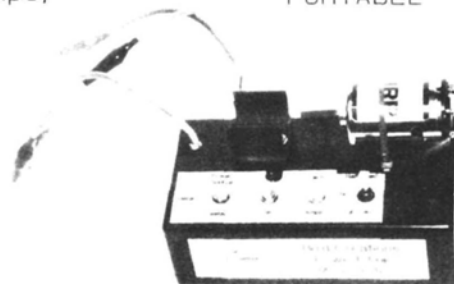


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SCOPING OUT

TEKIN TSC 411-G2

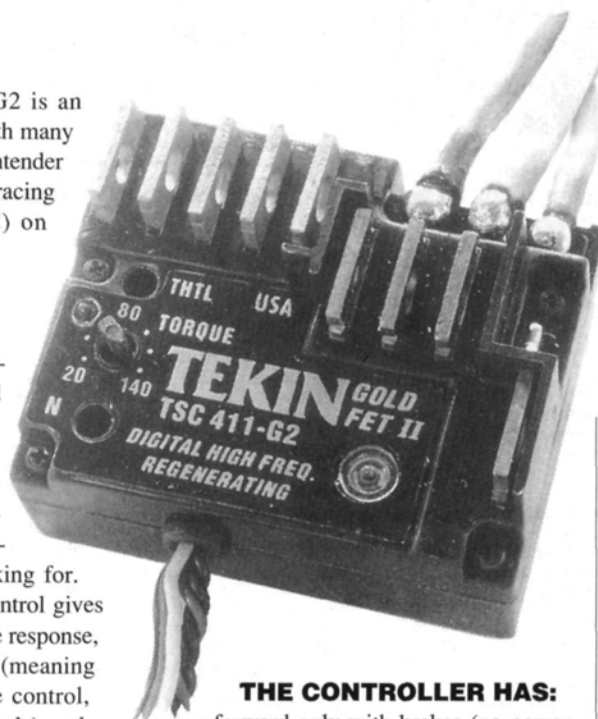
by JOHN RIST

WHAT IS IT?

The Tekin* TSC 411-G2 is an improved TSC 411-G with many new features—a new contender for the title of meanest racing speed controller (ESC) on earth?

MANUFACTURER CLAIMS

The 411-G2 offers *super-low* “on” resistance and high-frequency motor control. A high “on” resistance wastes power and makes the ESC over-heat, so a low “on” resistance is what we’re looking for. High-frequency motor control gives incredibly smooth throttle response, a cooler-running motor (meaning longer motor life), more control, (especially at lower speeds) and much longer run times.



THE CONTROLLER HAS:

- forward only with brakes (no power-robbing reverse)

- five FETs for forward; two for brakes
- one massive BEC voltage regulator
- automatic thermal protection
- neutral and full-speed adjustment pots
- built-in pulse-checking LED for setting neutral and full speed
- fuse to protect battery against reverse connection
- receiver plugs for all the popular brands of radios
- extra red monster wire
- accessory kit (heat sinks, motor caps, servo tape, tie-wraps, pot-adjustment screwdriver, adjustment hole plugs)
- decals, instruction.
- three-wire battery and motor hookup instead of the usual four, so you can keep the red wire (between the battery and motor) very short and reduce “on” resistance for better performance. (A four-wire setup can waste twice as much power as is lost in the actual speed controller.)
- a high-grade Deans Ultra-Plug—no factory installed connectors, which are usually useless for racing because they waste too much power. This ESC is intended for serious racing, so you can hard-wire it or use the Deans plug.

WHAT'S NEW?

• BATTERY- AND MOTOR-WIRE ATTACHMENT

The motor and battery wires are soldered to three massive copper studs, so even if you're not the Einstein of electronics, you'll be able to replace the battery and motor wires if they're damaged or have been shortened too much for you to use the ESC in another car. No need to send the TSC 411-G2 back to the factory! No more failed attempts to replace a wire and inadvertently fry your ESC to a crisp!

• CALIBRATED CURRENT-LIMITING KNOB

(sometimes called a “torque control”)—not a trim pot. The amp settings are printed on the case, so it's easy to change them at the track without using a digital voltmeter. If you don't trust the markings on the dial, connect the “test point” to a digital voltmeter, and obtain an accurate readout of the current-limit setting.

• A TOTALLY NEW CASE

The halves are held together with four screws on the top, so it's easier to mount, because no screw heads stick out of the bottom and interfere with the double-sided tape. The top half is held by the motor/battery wires and the fuse. You'd have to un-solder the motor and battery wires to remove it. With the bottom removed, I could see all the solder joints and most of the parts, so I didn't remove the top.

LET'S SCOPE IT OUT

The innards seemed to be of the usual high Tekin quality. Three groups of heat-sink tabs protrude from the top. They're for the:

- five forward FETs. Wired in parallel for very low “on” resistance, they provide the massive current handling for forward.
- two brake FETs, which provide strong braking, and a Schottky diode. (This protects the TSC 411-G2 from the motor's massive noise spikes and also plays a major role in providing the path for current regeneration.)
- massive BEC voltage regulator.

So far, I was impressed, but is it gutsy enough for serious racers? Let's run the numbers.

RESISTANCE IS USELESS!

With 12 amps of current flowing, I measure an ESC's "on" resistance twice.

It's difficult to measure resistance directly in a circuit with the power applied, so I measure the voltage drop across the controller, then I calculate the "on" resistance by dividing that figure by the 12 amps of test current. This gives the resistance in ohms ($V/I=R$).

- End to end test. I measured a voltage drop of 0.05 volt—a resistance of 0.004 ohm.
- 2-inch test. I measured a voltage drop of 0.04 volt—an amazingly low resistance of 0.003 ohm.

TAKING THE HEAT

In my "let-it-cook" test, I see whether an ESC can withstand back-to-back, 4-minute battery-pack dumps without overheating—with a heat sink, but without cooling air from a fan.

I jacked the current up to 20 amps (the average current a controller will endure during a 4-minute race) and let the ESC cook for 15 minutes. It was barely above room temperature! The TSC 411-G2 keeps its cool! Install the heat sinks and mount it where it will be air cooled, and the TSC 411-G2 should be able to handle multiple, hot-wind, modified motors.

COMING UP SHORT?

In my dead-short test, I put a jumper directly across the motor leads. The current jumped to 40 amps, but after a minute, the TSC 411-G2 was quite warm but not painful to touch—a testament to its super-low "on" resistance.

TWEAKIN' THE TEKIN

You can't really test an ESC's performance without installing it in a vehicle (I use a Kyosho Sideways), and you shouldn't try to install it without first reading the instruction book. The Tekin owner's manual contains most of the information you need, but I found the wiring diagram confusing, because it shows a four-wire setup, too. It would have been less confusing if Tekin had included a separate wiring diagram for each type. But there's a separate instruction sheet for the TSC 411-G2, and if you read it carefully, you shouldn't have any trouble installing the controller.

I prefer to hard-wire my motor and use a LiteSpeed connector to connect the battery and the controller. The supplied Deans Ultra Plug looks like a good connector and has the advantage of being polarized, so it prevents you from connecting the battery backwards. In fact, the controller will survive this kind of mistake by blowing its reverse-voltage-fuse

TEKIN TSC 411-G2**DIMENSIONS:**

Height	0.81 inch
Width	1.40 inches
Length	1.73 inches
Weight with wires.....	2.4 ounces

TUNING:

Access to controls.....	Good
Ease of adjustment.....	Fair

PRICE:

Suggested price.....	\$190.00
Warranty.....	120 days

ELECTRICAL:

(Manufacturer's specs)

Max voltage	(11 cells) 13.75 volts
Min voltage	(4 cells) 5 volts
Max current	not listed
Continuous current	300 amps
Resistance	0.0015 ohm

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps
Voltage drop end to end.....	0.05 volt
Voltage drop 2-inch wire point.....	0.04 volt
Calculated resistance:	
Voltage drop/current = resistance	
Resistance to end of wires.....	0.0041 ohm
Resistance 2-inch wire point.....	0.0033 ohm
BEC voltage, 6-cell pack.....	5.68 volts

COMMENTS: This controller has all the features that made the earlier TSC 411-G a world-class speed controller, and now you can easily replace the motor and battery wires. The TSC 411-G2 has world-class low "on" resistance, high-frequency motor control, torque control (with test point), and it runs cool under a heavy load. This controller is well-suited for just about any class of car, truck, or buggy. It's small enough to fit into 1/12-scale pan cars, yet it's strong enough to handle multiple modified motors. If you have never driven an HF-style speed controller, you'll be amazed at how easy it is to control the TSC 411-G2. Its current limit control is excellent and is adjustable over an extremely wide range. This controller is a winner, and it will find its way into the winners' circle in local and national level events.

"SCOPING OUT" LAB AND TESTS

THE LAB consists of:

- an oscilloscope
- a digital voltmeter
- a variable-load resistor bank
- a 6V 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors that can be switched on and off one at a time to vary the load between 0.6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent 0.01-ohm resistor. By measuring the voltage drop across this resistor, the current-meter's reading can be double-checked. Of course, the lab power supply provides the test current.

• VOLTAGE-DROP TESTS.

These are the first tests. It's virtually impossible to read an ESC's resistance directly, so I measure the voltage drop across it with the resistor bank set up for 12 amps of current. I then calculate the controller's "on" resistance by dividing the measured voltage drop by 12 amps. I take the voltage reading twice: along the full length of the battery and motor wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's "on" resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• LET-IT-COOK TEST.

I adjust the resistor bank to pass 20 amps of current, then I jam the throttle wide open and let the ESC pump the 20 amps.

• DEAD-SHORT TEST.

With this test, I check whether the controller can survive the heavy current caused by a jammed gear or a fried motor. No one likes to have this kind of trouble and discover that his ESC has been destroyed, too.

link, but you might miss the start of a race because you're back in the pits trying to solder the fuse link.

SO WHAT DO YOU GET?

Powered by a 6-cell pack, my Sideways[®] exploded off the line, spinning its back wheels with a vengeance when I hit the throttle.

- Slow and moderate speeds are silky smooth with precise control—the kind of control that should make it a snap to motor around a tight roadcourse. Its throttle smoothness is especially noticeable at the slow to moderate speeds.
- The brakes are very strong but controllable.
- Run times were longer than I had expected for my current gearing.
- Running the battery until it dumped didn't lead to a loss of control. That's bound to save you a race or two when it makes it that last 10 feet down the straightaway on an almost dead pack without veering into the wall.
- No glitching. I ran it way past the distance that's required to cover any race track.
- This controller will never have a problem with overheating. After each run, the battery and motor were smoking hot, but the TSC 411-G2 was barely above room temperature.

With a 7-cell pack, the Sideways was almost uncontrollable because of wheel spin, so I thought I'd try the current limiter (torque control). To test its range, I turned it down to minimum, put the car on the track and hit the throttle; it crawled. I then jacked up the current limiter a little at a time until the car ran at full speed but didn't spin its wheels on takeoff.

My driving tests confirmed my lab readings.

- For the first time, we have a car-style ESC with easy-to-replace battery wires and motor wires.
- This controller has an even lower "on" resistance than the TSC 411-G.

This controller is a *hot* performer with *no* bad habits. "Hot" describes its performance, but after a hard run, its heat sinks can only be described as *cool*! If you want to see a TSC 411-G2 in action, just visit any national or international race and see it used by those in the winners' circle.

**Here's the address of the company featured in this article:
Tekin Electronics, 940 Calle Negocio, San Clemente, CA 92673.*



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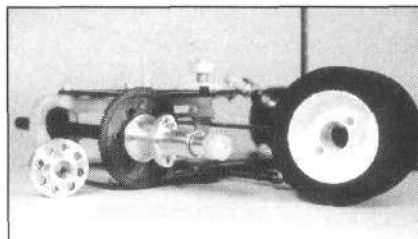
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CLEANING GAS CARS

(Continued from page 120)

at regularly. The ones that connect the front and rear diffs to the center gear assembly aren't as critical as the ones on the front and rear diffs themselves; if the latter are worn excessively, the car's handling can be drastically affected. The suspension will bind under acceleration if grooves are worn in the cups. This can make the car feel as if it's "loose" and very inconsistent. For best performance, check your outdrive cups regularly, and replace them when they're worn.

PROPAH!

Off-road gas cars can be some of the most fun cars to race and drive. Many people are intimidated by the potential mess that the mixture of fuel, oil and dirt can cause, but by following these simple suggestions and using some common sense (as well as some preventive maintenance), you can get many

hours of enjoyment out of your vehicle. Keep it clean! ■

PARKING LOT RACING

(Continued from page 119)

includes Rich Hohwart, Bill Jeric, Kent Clausen, Frank Killam and Paul Simith. The class has also brought back many of the early 1/12-scale racers who remember fondly that this is what racing was like when they first got into it back in the early '80s.

But the hobbyists are racers I can identify with. It's the group that gets up at 4:50 a.m. to watch the Williams Domination on ESPN. It's David "Gerhard" Berger putting the extra wind deflectors on Mike's Series-leading MP4/8. It's Fred Medel being first to the track with a genuine four-plane rear wing on his Footwork FA14B, or DJ's French blue Ligiers. Along with Benettom Watana, Boyd and the HobbyTown crew,

we were invited to put on our particular circus at Tamiya America's Hobby Market Days. We got a chance to conduct some seminars and show hobby-shop owners just exactly how much fun we're having. ■

LETTERS

(Continued from page 9)

"Kyosho/Car Action Gas Challenge" article in the October issue of Car Action for more info), and they also recently introduced the Sandmaster—a relatively inexpensive 1/10-scale gas buggy that can easily be upgraded to a full-blown racing vehicle. Check out our track directory in this issue for the track listings in your state that offer gas racing, and see if they run 1/10-scale nitro trucks. They may not be buggies, but at least they're still 1/10 scale. JH

(Continued on page 162)

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Locking Nut Idle Adjuster



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LETTERS

(Continued from page 144)

PARKING LOT RACING

When I saw the September '92 "Inside Scoop," I was very excited to see that Kyosho was making a budget F1 car. I was even more excited when I read that Indy car bodies were in the works. Since then, however, I haven't read anything else about them.

On a recent trip to a local Hobby Town USA, I saw the Williams-Renault F1, but not an Indy version. Is Kyosho going to make an Indy version? If so, is a Penske in the works? I sure hope so, because I've

wanted a Penske Indy car ever since I got into R/C.

PAUL FREDE
Fresno, CA

Well, Paul, Kyosho does have an Indy car, and it's fashioned after the Target car that's piloted by '93 Indy 500 polesitter Arie Luyendyk. The car is based on and has the same retail price as their Formula 1 cars. Besides the Williams Renault F1 car, Kyosho also manufactures a Ferrari F1, a Benneton Ford F1 and a Jordan Yamaha F1 car. If you really want to be hi-zoot, you can buy the Indy body separately and paint

it to replicate Rick Mears' Penske car. Autographics of California [(805) 836-2886] offers a Rick Mears Indy decal sheet (part no. 643). Once you're set up with your Indy car, you'll have to check out the parking lot racing scene out there in California. It's the latest rage! Look elsewhere in this issue for Chris Chan's article on the basics of parking lot racing. JH



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